THE

OPERATIONS

IN

SURGERY

OF

Monſ. LE DRAN.

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The EIGHTH EDITION of

The Anatomy of the Human Body.

By W. CHESELDEN,

Surgeon to his Majeſty's Royal Hoſpital at *Chelſea*, F. R. S. and Member of the Royal Academy of Surgeons at *Paris*.

Illuſtrated with Forty COPPER PLATES.

Printed for H. WOODFALL, R. BALDWIN, W. JOHNSTON, J. DODSLEY, HAWES CLARKE and COLLINS, and S. CROWDER.

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SURGERY

OF

Monf. LE DRAN,

Senior Surgeon of the Hofpital of *La Charité*,
Confultant Surgeon to the Army,
Member of the Academy of Surgery at PARIS, and
Fellow of the Royal Society at LONDON.

TRANSLATED

By Mr. GATAKER, Surgeon.

WITH

Remarks, Plates of the Operations,

AND

A Sett of INSTRUMENTS,

By Mr. CHESELDEN,

Surgeon to the Royal Hofpital at CHELSEA, and Member of the Academy of Surgery at PARIS.

Manu ftrenua, ftabili, nec unquam intremifcente. Celfus.

THE FOURTH EDITION.

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PREFACE.

THE practice of Surgery in *England* has of late years received ſuch great improvements, that to offer the public the ſentiments of a foreign writer upon this ſubject may ſeem perhaps at preſent unneceſſary. This Conſideration at leaſt would in general have ſuppreſſed any ſuch intention in me; but the great commendations which have been given to the following treatiſe in the original, will, I imagine, recommend a tranſlation of it. In the execution of this undertaking, I have endeavoured chiefly to be exact and faithful to the original, not only in juſtice to the author, but in reſpect to any connection which particular parts might have with

Mr.

Mr. *Chefelden's* notes. I ſhall trouble the reader no farther than to acquaint him that the references which Monſ. *Le Dran* has made to his Book of *Obſervations*, I have applied to the tranſlation of that Work.

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A TREATISE OF THE OPERATIONS IN SURGERY.

INTRODUCTION.

AN OPERATION in surgery is a methodical application of the hand or instruments upon the human body, either to preserve or restore health, or to palliate such disorders as are incurable.

To answer these intentions there are four general methods employed in surgery, which are distinguished by the following names, viz. *Synthesis*, *Diæresis*, *Exæresis*, and *Prothesis*, and the indication of their several uses is derived from a just knowledge of diseases. The reason that has induced authors to continue these Greek terms, seems to

be well founded, as they not only characterise each operation in particular, but denote the various purposes they may be applied to in different diseases.

It might not be improper in this place to observe the remarkable difference between the ancient and modern practitioners in the performance of these four operations, which were known to the ancients, and are described in their writings under the preceding denominations; but this would carry me beyond my design. The ancients only laid the foundation, which was doing considerable service: They who have come after them have worked upon their plan, and from time to time the art of surgery has received improvements; but the last age particularly has so enriched it with new discoveries, as renders it not at all surprising, that we, who have brought the art to a still greater perfection, should in many things differ from them both in the manner of operating and the treatment in general.

To avoid confusion, I shall omit in the theoretical part many of those divisions and subdivisions, with which authors abound, as being of no use towards promoting practical knowledge in beginners, but tending rather to confound than improve them. For the same reason I shall suppress many of their Greek terms, reserving such only as are in general use.

As to the manner of performing operations, I shall not particularly examine into every method that has formerly been made use of, and which some of the moderns perhaps may still retain; but shall content myself with describing that which I conceive most eligible, and giving such reasons for it as are founded upon experience.

Of

Of the Synthesis.

SYNTHESIS is an operation of surgery by which those parts that are divided are brought together, and retained in that situation.

IT is employed both on the hard and soft parts: upon the hard parts on two occasions, namely, in luxations and fractures. Thus we have recourse to the *Synthesis* in the reduction of dislocated bones, or when we bring together the pieces of a fractured bone.

IT is used also to the soft parts upon two occasions. In the first, where we re-place with the hand, without the use of instruments, the parts that have quitted their natural situation, as in the reduction of an intestine or the epiploon, when they are fallen out of the abdomen and form a *Hernia*. This kind of *Synthesis*, authors have named *Taxis*. In the second we facilitate the re-union of the soft parts that have been divided, which is done, either by making a new division, as by a suture with a needle; or without making a new division, as when we bring together the lips of a wound and keep them so by a dry suture, or a proper bandage.

THE success of these operations depends greatly upon a right application of bandages, compresses, splints, &c. and upon putting the parts affected in a proper position.

Of the Diæresis.

DIÆRESIS is performed by dividing those parts that are naturally united, and is equally employed upon the soft and hard parts; but as it may be undertaken by different methods, we shall divide

them into three kinds, namely, cutting, lacerating, and burning. All the kinds of cutting which can be made in the ſoft parts may be reduced under the general term of inciſion, as they may be almoſt all performed with the knife. The caſe is different in the hard parts, where the ſame inſtrument will not always ſerve the purpoſe. Sometimes we perforate the bone, as with a crown ſaw, called a trepan; ſometimes we ſaw it with a ſtrait ſaw; upon other occaſions we ſcrape it with a rugine, ſometimes we uſe a file, and at other times cut it with the inciſive pincers, or a gouge, which is a kind of chezil. We may diſtinguiſh therefore the inciſions made uſe of to the hard parts into four kinds; namely, ſawing, ſcraping, filing, and cutting.

LACERATION, the ſecond ſort of *Diæreſis*, is uſed alſo to the ſoft and hard parts. In extracting the polypus we lacerate: and the ſame thing is done in the extirpation of ſchirrous glands, and in many other operations, when, having divided the teguments with a biſtory, we break the membranous bridles in the wound with our fingers. Lacerating of the hard parts is only uſed in drawing the teeth.

BURNING, a third manner of performing the *Diæreſis*, may be uſed both to the hard and ſoft parts, or with the actual or potential cauſtics. As to the ſoft parts, burning them with the actual cautery, which was very cuſtomary among the ancients, has too much the appearance of cruelty, and therefore now very ſeldom made uſe of; but we frequently have recourſe to it, and with great ſucceſs, in a deep *caries* of the bones, in order to promote their exfoliation.

I SHALL paſs over the puncture, which has been admitted by authors as another ſpecies of *Diæreſis*, ſince

ſince by the word puncture, we ought only to underſtand a ſeparation of the fibres from each other without a diviſion of them; whereas in the different kinds of punctures which they treat of, and which are made by the lancet, leeches, or the trocar, there muſt neceſſarily be a diviſion and even an inciſion, whence a bleeding of the part enſues. It is not therefore a puncture, but a very ſmall diviſion.

Of the Exæreſis.

THE *Exæreſis* conſiſts in removing extraneous ſubſtances out of the body that are prejudicial to it; and this is performed differently according to the different ways in which theſe ſubſtances were received: that is, either by making a freſh wound, or not: if without making a freſh wound, it is done by removing the extraneous body at the natural opening where it entered, or by the opening which it made at its entrance. The other method is by making a wound to procure it an eaſy paſſage, in caſe there is not one already, as in lithotomy; or by enlarging the wound, if it is too ſmall; or elſe by a counter-opening, made to perform the extraction more conveniently and with leſs danger.

Of the Protheſis.

THIS, which is deſcribed as the fourth chirurgical operation, conſiſts only in putting on, and adapting an artificial member where the natural one is wanting, and is done for ſeveral purpoſes; as a glaſs eye is deſigned for ornament, a wooden leg or arm for uſe; and ſometimes neceſſity requires it, as in the application of an artificial palate.

Neceſſary and uſeful conſiderations.

As theſe operations are intended to promote the health of our fellow-creatures, they require, upon that account, the ſtricteſt attention in those that perform them.

The firſt thing that requires the ſurgeon's conſideration, is to endeavour to gain a thorough knowledge of the diſeaſe entruſted to his care, in order to take a proper method for the patient's relief. If the diſeaſe cannot be removed but by an operation, he ought to conſider at the ſame time, whether in conſequence of ſuch an operation a worſe diſeaſe may not enſue. For inſtance, how often have people that were troubled with the piles (which nature had choſen as a uſeful drain to the conſtitution), after being cured by an operation, been ſubject to ſome other more dangerous diſeaſe?

He ought in the next place to conſider the age of his patient, his ſtrength, and the ſtate of his mind; and to judge from thence whether he is capable of ſupporting the fear, pain, and danger of the operation. Fear, we know, has a great effect upon the conſtitution, and we have ſeen inſtances of patients, who, immediately upon knowing there were no other means of cure than by an operation, have fallen into the moſt unhappy condition. Pain, as is evident by examining the circulation with a microſcope, occaſions ſuch ſpaſmodic motions upon the fibres as check the blood in its circulation, and ſometimes oblige it to return in the veſſels; thereby altering or ſuſpending the courſe of the fluids, even in the capillaries. Hence probably may ariſe the inflammations which frequently appear after an operation. And it is from a due conſideration of all theſe circum-

 ſtances,

ſtances, that a ſurgeon is to form a juſt diagnoſtic to direct him in the management of the diſorder, and to undertake a radical or palliative cure, as may beſt contribute to the good of the patient, the credit of ſurgery, and his own reputation.

If the operation is judged neceſſary and practicable, the next conſideration is to chuſe, as far as circumſtances will admit, the moſt ſuitable time to undertake it. There are ſome operations for which we may, and indeed ought to, wait a favourable ſeaſon; but there are others which will not admit of being deferred, and by delay would become more dangerous. In the laſt caſe, care muſt be taken to correct the air in the patient's chamber according as the degree of heat or cold requires.

The time being fixed for the operation, there are ſtill three circumſtances to be attended to, namely, what ought to be done before, at, and after the operation. Before the operator begins, he ſhould conſider the natural ſtructure of the part, the ſtate of the diſeaſe, and the alterations it may have occaſioned in the conſtitution; in ſhort, he ſhould firſt perform the operation in his imagination, and foreſee the accidents that may ariſe: by being thus appriſed, he will be better able either to avoid or to remedy them more effectually if they ſhould happen.

He ought to furniſh himſelf with good inſtruments, and to have a duplicate of each, in caſe one ſhould be ſpoiled.

He ſhould provide himſelf likewiſe with ſtypticks and other aſtringents, and ſeveral needles ready threaded, to make a ligature, if neceſſary, upon the veſſels.

If he performs the operation by candle-light, he ſhould have ſeveral lighted, leſt that which he uſes ſhould accidentally be put out. The

The proper dreſſings for the wound ſhould alſo be prepared.

Immediately before he begins the operation, he is to place the patient and the aſſiſtants in a proper ſituation, having firſt given inſtructions to the latter, what each of them are to do, who by this means will underſtand, upon the leaſt hint, what the operator intends, and will execute their parts better and more readily. As to the patient, he ſhould be placed in as eaſy a ſituation as poſſible, that he may continue in it 'till the operation is over.

Every thing being thus got ready, the ſurgeon begins the operation: which ſhould be done *expeditiouſly*, and *effectually*; *expeditiouſly*, becauſe every moment of ſuffering appears long; nevertheleſs, the operator muſt allow himſelf ſufficient time; and when I uſed the word *expeditiouſly*, I only meant that he ſhould not loſe time, taking great care not to be over haſty, leſt his hand out-run his judgment, which ſhould direct it: an operation is always ſoon enough done that is well done. He is likewiſe to operate *effectually*, that is, in ſuch a manner as not to be obliged to renew the operation, or to make freſh inciſions. If the caſe requires that the operation ſhould be done at twice, or if he plainly foreſees there will be impoſthumations and ſinuſes which muſt be afterwards opened, he ought to mention this beforehand, to prevent the patient being alarmed when it happens, as well as to preſerve his own character. In performing the whole, he ſhould endeavour to give as little pain as poſſible, and not to incur the imputation of cruelty.

The operation being over, he is to dreſs the wound, and put the patient in ſuch a ſituation as may be eaſy, and likewiſe convenient for his diſorder.

He

He is afterwards to correct the present symptoms, and prevent, as much as possible, those that may supervene.

As the success of all our operations depends much upon the assistance of nature, and as the inflammation which may ensue is one of the most common symptoms, and also the most capable of frustrating our design, I think it proper to begin with the article on that head; to lay down such methods as may prevent it as much as possible; to give an account of its rise and progress, its different terminations, and the means that may be used for relief.

Of an INFLAMMATION.

THE several parts of the body are composed of nerves and vessels which either convey the fluids from the centre to the circumference, or bring them back from the circumference to the centre. By the centre is meant the left venticle of the heart, from whence the circulating fluids take their rise, and to which they are again returned. By the circumference we understand every part from whence any vessel arises that re-conveys to the heart the remainder of the fluids, after they have performed the offices of nutrition and secretion; and as such re-conveying vessels arise from almost every part of the body, so the whole may be considered as the circumference.

THESE vessels are divided into arteries and veins: The arteries are of two kinds; first, those which are called sanguinary arteries, arising from the heart by a great trunk termed aorta, which afterwards subdividing into innumerable branches, distribute

ſtribute the arterial blood to the ſeveral parts. Secondly the lymphatic arteries, which take their riſe from the former, at different diſtances, and convey to the parts a limpid fluid ſeparated from the arterial blood. The veſſels that re-convey these fluids are likewiſe of two kinds; the ſanguinary veins, which return the greateſt part of that blood, which the ſanguinary arteries conveyed to the circumference; and the lymphatic veins, which reconvey the remaining lymph brought thither by the lymphatic arteries. As the good ſtate of theſe fluids is neceſſary for the attainment of health, and preſervation of life; ſo the due diſtribution of them, and the juſt ſtructure of the veſſels wherein they circulate, is equally requiſite; and either to a diviſion or an obſtruction of theſe veſſels moſt Chirurgical diſorders are owing.

If the fluids are too violently propelled into any of the capillaries, it is poſſible that ſome of the floating particles, being too large for the diameters of thoſe veſſels, may ſtop, and cauſe an obſtruction; and, unleſs there are ſome collateral tubes capable of conveying them on in the courſe of the circulation, they muſt neceſſarily be more ſtrongly fixed, and the obſtruction thereby become more confirmed. It is this obſtruction which we conſider as the cauſe of an inflammation, in whatever veſſel it happens, whether ſanguinary or lymphatic. From this time the tumor commences, tho' it may not yet be apparent; but, in proportion as the obſtructions extend to the neighbouring parts, the tumor increaſes.

Amongst the different parts of our bodies, ſome have a larger ſhare of ſanguinary, others of lymphatic veſſels, and this may be diſtinguiſhed by the different colour which is predominant in each part. If the obſtruction be in the lymphatics only,

only, we may term this inflammation an erysipelas; if in the sanguinary vessels, a phlegmon; but as throughout the whole body there is always a congeries of sanguinary and lymphatic vessels, so we rarely find a tumor simply erysipelatous or phlegmonous, tho' we every day, in practice, make use of the words phlegmon and erysipelas. All the distinction we can make then is, when the inflammation is chiefly situated in the sanguinary vessels, and affects the adipous parts, to call it an erysipelatous phlegmon; when it attacks the membranous parts, to term it a phlegmonous erysipelas.

WHATEVER is capable of giving an increased velocity to the blood, or can thicken or coagulate it, may produce these obstructions; whether by introducing into it any heterogeneous matter, as ill-digested aliments, or any poisonous substance, or by incrassating the fluids by profuse sweats, or a too large discharge of urine, &c. They may also arise from an external irritation by puncture, excoriation, or incision; likewise from any long compression, violent contusion, or extension, which destroy the elasticity of the vessels that assist the progressive motion of the blood.

FROM an obstruction proceeds a stagnation; that is, the fluids intirely lose their progressive motion; first in some of the tumified vessels, and afterwards in others where they circulated but slowly. These stoppages, and the alterations they may occasion in the obstructed fluids, happen sooner or later, according to the degree of their velocity or their disposition to fermentation; and hence has arisen the distinction which authors have made, of tumors formed either by fluxion or congestion; though it is certain they are all formed according to the same laws, and these expressions only signify the *modus agendi*.

FROM

From whatever cause these disorders arise, they always terminate either by a resolution of the obstructed fluid, an induration of the tumor, by suppuration, or a gangrene.

Termination by Resolution.

Resolution is a motion in the obstructed fluids, which causes part to transpire through the pores, and the rest to enter again into the course of the circulation:

Two things are necessary to procure this resolution.

The first is, to abate the nisus of the solids, and lessen the weight and quantity of the blood; as these tend rather to increase the inflammation than remove it: In this view bleeding is necessary, either evacuative, revulsive, or derivative, as the strength of the patient will admit, and the circumstances of the case require. The second is, to have a regard to the disposition of the fluids; for which purpose such a diluting regimen ought to be prescribed as may retard the progressive motion of the blood, allay its effervescence, and conduce to its fluidity and attenuation. If the tumor is in neither of the great cavities, but situated within the reach of external applications, we should assist nature by applying emollient cataplasms in order to relax the fibres of the obstructed vessels, and thereby prevent their laceration, by making them yield to extension; to which should be added resolvents, to attenuate the obstructed fluids before they become putrid, causing part of them to transpire through the pores, and the remainder to pursue its course in the circulation.

When the resolution is made, the tumor diminishes,

miniſhes, the pain and fever abate, and the applications are leſs apt to dry upon the part. But if, in oppoſition to our endeavours, the inflammation ſtill increaſes, it will terminate either by ſuppuration, a ſchirrus, or gangrene, according to the diſpoſition of the ſtagnated fluids; and in that caſe, if the diſorder be external, ſuppuration ſhould be promoted to prevent its terminating in a ſchirrus or gangrene, which are both to be avoided; but, if the tumor is ſituated in any of the great cavities, out of our reach, we muſt leave it to nature to determine the event.

Termination by Schirrus.

THE obſtructed fluids are not always diſpoſed either to be reſolved, or changed by fermentation, into *pus*; but, notwithſtanding the application of the moſt efficacious topics, they will ſometimes be ſo inſpiſſated in the veſſels, that the tumor remains hard and almoſt indolent. This happens chiefly in the glandular parts, agreeable to the nature of their fluids: and the only way to prevent this accident, is by the uſe of diluting medicines of the ſpirituous kind, and emollient topics of a moderate warmth. Unctuous and emplaſtic ſubſtances ſtop the pores, and ſuch as are very hot thicken theſe fluids, which are not of a nature to admit fermentation.

THOUGH the tumor, thus terminating, does not ſeem at preſent to prejudice the parts affected, yet in time it may produce ill conſequences by its preſſure upon the neighbouring veſſels, and thereby impeding the free courſe of the circulation. An account of ſuch a ſchirrus in the epiploon may be ſeen in my *Obſervations*, p. 223.

If

If a tumor of this kind be ſituated externally, we may hope, by the uſe of baths, pumping on the part affected, and ſuch like remedies, to attenuate the fluids gradually, and ſo to excite their principles to motion, that they may either reſolve themſelves, or come to ſuppuration; in either of which caſes the diſtemper will be removed.

Termination by Suppuration.

It is ſeldom that the obſtructed fluids remain intirely inactive, but are often put into motion by a kind of fermentation which diſſolves them: By this means their bulk is increaſed, and the veſſels being very much diſtended, become thin, break, are attenuated, as it were, by attrition, and mixed with the putrifying fluids: ſo that altogether they are formed into a ſubſtance, which we call *pus.* When the tumor is thus diſpoſed to ſuppuration, we ſhould promote the formation of matter by applications that will ſoften the teguments, advance the fermentation and maturation of the collected fluids, and confine the heat and the perſpiration; ſuch as warm oils, the gum plaſters, cataplaſms with lily roots, &c.

The ſymptoms that attend the formation of *pus*, are pain, heat, tenſion, a pulſation and fever: Pain is an inſeparable concomitant, as the two only cauſes that can produce it, are here united; namely, a forcible extenſion, and a ſolution of continuity; and according to the different degrees of theſe, the pain is more or leſs acute. The fermentation cannot be carried on without a proportionable warmth or heat: The pulſation ariſes from the increaſed action of the heart and arteries, in order to continue the circulation; to which may be

be added, that parts in a ſtate of tenſion are moſt ſenſible of their vibrations. Laſtly, where the courſe of the fermenting fluids is retarded, it is almoſt impoſſible, but ſome part of them muſt be ſeparated and return into the circulation; and this produces a fever, which, from the ſame cauſe, increaſes till the maturation is completed. When the matter is formed, we find the bulk of the tumor apparently augmented, the redneſs of the part abated, and by preſſing with a finger on each ſide the tumor, you may feel a fluctuation of the matter: Sometimes the cuticle ſeparates, as it does in a gangrene.

The proper time of opening abſceſſes or impoſthumes in general, is, when the *pus* is formed, and diſcoverable by the fluctuation of it; nevertheleſs there are ſome exceptions to this rule. Some of theſe tumors ſhould be opened before the maturation is compleated; ſuch as critical abſceſſes, which ſometimes terminate malignant fevers. But in thoſe, which, according to the expreſſion of the ancients, are made by congeſtion, the fermentation of the obſtructed fluids being very ſlow, there uſually remain indurations, which may be felt about the circumference of the fluctuation, and are not eaſily reduced into *pus*. Theſe ought not to be opened too haſtily, for the matter, by being confined, more eaſily waſtes them, than any digeſtives that can be afterwards applied. If they are opened too ſoon, it is long before they diſſolve by ſuppuration, and even ſometimes cauſe the return of ſuch accidents as very much interrupt the progreſs of the cure. An inſtance of what is here advanced may be ſeen in an account of ſuch an abſceſs, related in my *Obſervations*, p. 277. It is not right therefore to open ſuch abſceſſes, 'till they are ready to break of themſelves.

WHAT

WHAT we commonly call boils, ought not to be opened till the matter begins to puſh through the ſkin. Theſe tumours are generally ſituated in the *membrana adipoſa*, where the matter does not ferment ſufficiently to deſtroy it immediately, but ripening there gradually, is diſtributed into different cells, like honey in a honey-comb. Thus when the matter firſt breaks through, all the cells do not diſcharge their contents at once, but after a few days, the remaining membranes ſuppurate, and are reduced into *pus*. When theſe boils are ſmall, it is ſufficient to aſſiſt nature by maturative applications, and they will heal as they ſuppurate; but if they are large, it will be neceſſary, as ſoon as the ſkin is perforated (which is a ſign the matter is formed) to make a further opening, either by a crucial inciſion, or ſeveral ſcarifications all over the tumor; that the cells in general may be opened, which are as ſo many diſtinct abſceſſes contained in one tumor.

WE daily ſee abſceſſes break without any other aſſiſtance than the maturatives before mentioned. In proportion as the applications ſoften the ſkin, the matter fermenting waſtes and deſtroys it, and procuring itſelf a paſſage, diſcharges. If theſe abſceſſes are ſmall, they will readily heal: The ſides of the cavity wherein the matter was depoſited, are brought near each other by their elaſtic diſpoſition, and the cavity fills up; but if they are large, and not ſituated in very fleſhy parts, there generally remains a *fiſtula*, occaſioned by the difficulty of bringing the internal parts of the cavity near enough together. In order therefore to effect a cure, the *fiſtula* muſt be opened, and the external aperture made larger than the bottom. *Vid.* the chapter of the FISTULA.

THE

The manner of opening abſceſſes is either by cauſtick or inciſion.

In order to do it by cauſtick, the tumor muſt be covered with a very adheſive plaſter, having a hole cut in the middle, of ſuch a form and ſize as it is intended the aperture of the tumor ſhould be. Into this the cauſtick ſtone muſt be laid, which ſhould firſt be moiſtened to render it effectual, as the ſalts of the ſolid cauſtick will not act till in a ſtate of diſſolution. The whole muſt be covered with another plaſter, compreſſes, and a bandage. In two or three hours we take off the dreſſings, and, if the ſtone was well prepared, we find a black, hard eſchar at the place where the cauſtick was applied. Through this we paſs a lancet, or biſtory, as deep as the *pus*, making an inciſion the whole extent of the eſchar, or beyond, if the cavity of the abſceſs requires it.

In ſome caſes it is better to make the opening with a cauſtick than a lancet; as in critical abſceſſes, which ſometimes terminate in malignant fevers; for as the matter that is depoſited, either in the glands or elſewhere, may be carried away by the violence of the fever, and re-paſs into the blood, it is neceſſary to open theſe tumors before the maturation is compleated. The opening made by cauſtick anſwers much better in theſe caſes than that by the knife, as it deſtroys the parts which are impregnated with the malignant humour. The whole eſchar ſhould be ſcarified, and ſmall orifices made where the matter began to form; by which means the humour will be prevented from returning into the circulation. After this is done, we endeavour to digeſt off the eſchar, and bring the wound to ſuppuration.

We would propoſe likewiſe to open thoſe abſceſſes by cauſtick, which are made by congeſtion; for as in theſe caſes the fluids are of a cold nature, and maturative applications have but little effect, the irritation of the cauſtick inflames the part, and helps to ripen the *pus*; and at the ſame time the largeneſs of the ulcer which the eſchar produces, makes it unneceſſary to take off the lips of the wound, and likewiſe preſerves the opening longer.

But the moſt uſual, and generally the moſt convenient, way of opening abſceſſes, is by inciſion; and this may be done, either without loſs of ſubſtance, as by cutting only through the teguments of the abſceſs; or with loſs of ſubſtance, i. e. by taking off part of the lips of the wound.

It is not the ſize of the abſceſs that ſhould determine us for either method, but the injury which the matter has done under the *membrana adipoſa*, or the ſkin.

If the *pus* is ſuperficially ſituated, and has but ſlightly ſeparated the teguments from the muſcles, it is ſufficient to make an inciſion the length of the tumor. To this purpoſe, we paſs the point of the knife in at one end of the tumor as deep as the *pus*, carrying it on to the other end in a ſtreight direction. We then introduce a finger into the wound, and continue the inciſion, if it is not already long enough.

When abſceſſes are ſituated deep among the muſcles, we often meet with membranous bridles which the matter has not diſſolved: Theſe ſhould be broke with the finger, or, if that is not ſufficient, they ſhould be cut.

If, by examining the tumor before the opening is made, we find the matter is diffuſed under the *membrana adipoſa*, or the ſkin, we muſt not rely

upon

upon a ſimple inciſion, as this would leave a looſe lip on each ſide, which turning inwards would make the dreſſings painful, and hinder the digeſtives from being eaſily applied to every part of the ulcer. In this caſe therefore we muſt cut off part of one or both theſe lips with the ſciſſars or biſtory.

To do this in the common way will require at leaſt three inciſions, but as we ſhould avoid, as much as poſſible, giving pain to the patient, I chuſe rather to perform it in the following manner. By the firſt inciſion, which is ſemicircular, I cut into the tumor laterally to the place where I ſhould ſtop if I was to take off one ſide only, then make another on the other ſide anſwering to the firſt in ſuch a manner that the extremities of each inciſion ſhall meet. Thus there will be but two inciſions, inſtead of three, as are uſually made, and the patient is thereby ſpared one third of the pain.

When thoſe large phlegmonous eryſipelaſes, which ſeize upon an intire limb, as the fore-arm, leg, &c. terminate in a ſuppuration, we find ſometimes that the matter, having ſeparated the greateſt part of the *membrana adipoſa* from the muſcles, ſpreads perhaps half round the limb. In opening theſe abſceſſes, whether it be with or without loſs of ſubſtance, we are often obliged to make a counter-inciſion in the part moſt depending when the patient is in bed; otherwiſe the matter might ſtagnate there for want of a free diſcharge. The manner of doing this is by introducing into the wound either a finger, or a blunt-pointed probe, and thereby fixing the ſkin; then with the point of a knife we cut through the ſkin on the outſide, as much as may be ſufficient, and paſs in a ſeton, one end of which ſhould hang out at the wound.

In whatever manner an abſceſs is opened, we ought at the firſt dreſſing to fill up the cavity, where the matter is lodged, with ſoft lint, that it may not create pain by preſſing the lips of the wound.

By the uſe of digeſtives, the ulcer comes to ſuppuration, and in a few days all the circumference that was inflamed diſcharges itſelf into the wound; and thus the *pus* that flows from it is large in quantity and of a bad ſort; but after this, the quantity leſſens, the matter becomes white, thick, and inoffenſive: This is the proper time to remove the ſeton.

The lips of the wound, which were contracted a little before, come now into a narrower compaſs, and fleſhy granulations ariſing, the wound fills up, and entirely cicatriſes with the uſual dreſſings.

Termination by Gangrene.

The inflammation may alſo terminate in a gangrene; but as that appears in different forms according to the different cauſes which produce it, I ſhall endeavour to give ſome account of each; and firſt,

Of a gangrene by compreſſion. As the free courſe of the fluids is neceſſary to preſerve life in the different parts, it is not at all ſurprizing that a gangrene ſhould ſeize upon the buttocks, back, hips, or elbows of thoſe who have been long afflicted with malignant fevers. The fluids in ſuch caſes are vitiated, and thoſe parts ſuffering a preſſure from the poſture in which the patient lies, an obſtruction of the circulation enſues. The part at firſt appears pale, then of a lead colour in the middle, and red at its circumference; afterwards it retains the impreſſion of the finger, becomes inſenſible, and turns black. To

To prevent this accident, the patient ſhould be carefully watched, and often obliged to change his ſituation, that no particular place may long ſuffer a compreſſion; and now and then the parts ſhould be rubbed with brandy to harden the cuticle. If, notwithſtanding theſe precautions, the ſigns of a gangrene appear; we muſt then have recourſe to ſurgery, in order to prevent a ſphacelus, as will be hereafter directed.

SECONDLY, *Of a gangrene from an internal cauſe.* This always ariſes from an impoveriſhment of the fluids, which renders them incapable of invigorating the parts. There are ſeveral things which may produce this alteration. A ſcorbutick or venereal *virus* is often the occaſion of it, but old age more frequently than any other cauſe. The active principles of the conſtitution, which animate the fluids, are ſometimes deſtroyed at a certain period preſcribed by nature: This often happens to ancient people, though it may likewiſe be the conſequence of great diſorders.

THE circulation in theſe caſes becomes languid, and ſtops at firſt in ſome of the capillary veſſels of the extremities. The part ſwells a little, and retains the impreſſion of the finger, is attended with ſome degree of pain, and changes its colour from pale to livid. Round the circumference may be perceived a ſlight redneſs, afterwards a gangrenous ulcer is formed, which will not admit of being deterged, but daily increaſes. The gangrene ſpreads by degrees, and at laſt riſing inſenſibly to the vital parts, the patient dies. Inſtances of this kind have been ſeen where the gangrene, which firſt attacked the toes, was more than a year before it reached to the hip. In ſuch caſes, amputation can be of no uſe, but on the contrary would rather

hasten the patient's death. I knew a woman fifty years old, of a bad habit of body, who had a gangrene that began by a ſmall ſpot of the bigneſs of a lentil, and free from pain, at the end of the great toe, which ſpread itſelf afterwards all over that part. My opinion was, not to cut it off, but I was obliged to ſubmit to one of my ſeniors, who adviſed the amputation. The gangrene appeared afterwards on the inſtep, and it was a year before it reached the knee. The perſon who propoſed the amputation of the great toe, ſeeing the gangrene on the inſtep, deſiſted from adviſing any further operation.

THIRDLY, *Of a gangrene from a defect of the animal ſpirits.* We find that perſons who have received any ſhock or cut upon the ſpinal marrow, or ſuffered any great compreſſion there, as in a luxation of the *vertebræ*, become paralytic in thoſe parts which are below the place that was primarily affected. This is a circumſtance not to be wondered at, as the veſſels receive their elaſticity from the ſpirits, which enables them to reſiſt the influx of the fluids that always tends to dilate them, and alſo gives them that oſcillatory motion, which aſſiſts them in carrying on the courſe of the circulation. If the animal ſpirits are no longer conveyed to them by the nerves, the fluids circulate at firſt more ſlowly, then inſenſibly ceaſe to flow at all, and the veſſels are obſtructed. Theſe parts likewiſe become emaciated, flaccid, and ſometimes intirely inſenſible; and the leaſt preſſure upon them occaſions firſt a gangrene, and afterwards a *ſphacelus*.

IF we can give relief to the ſpinal marrow, it is poſſible to prevent the gangrene; but if that cannot be effected, no other means will be ſufficient to ſtop its progreſs.

FOURTHLY,

Fourthly, *Of a gangrene proceeding from a ſtoppage of the returning fluids.* I have known a gangrene brought on by a ligature or compreſſion being made on the trunk of thoſe veſſels which bring back the fluids to the heart. This produces a ſwelling of the part, which hardens and appears of a dark red or violet colour, wherein the patient feels a throbbing and a general numbneſs, and then loſes all manner of ſenſation in it. Little veſications ariſe in ſeveral places; and at laſt it becomes black, and mortifies.

It is plain the only way to cure this diſorder, and prevent the gangrene, is to remove the obſtacle to the blood's return.

Fifthly, *Of a gangrene from cold.* We ſometimes ſee members that are frozen become gangrenous inſenſibly; which ariſes likewiſe from obſtruction. The cold contracts and hardens the texture of the veſſels as it does every other body in nature; and congealing the fluids, it interrupts their courſe, and they ſtop in ſome of the capillaries the moſt diſtant from the heart. The part affected is at firſt very red and painful, then pale and inſenſible, afterwards it hardens and turns black, unleſs the progreſs of the diſeaſe be ſtopt before it be very far advanced. In this caſe the fluids are equally diſpoſed to congeal over the whole body, and therefore we muſt not think ſo much of reſtoring that particular part, as to renew a general warmth, by a gentle, mild heat, communicated to the blood. For this purpoſe, let the patient breathe a moderately warm air, by which the warmth of the fluids being gradually renewed, will re-animate the part affected, and again reſume their uſual courſe. It has been obſerved, that perſons

who have ſuffered in this manner, by paſſing over the mountains in hard froſts, have recovered their natural heat much more eaſily in a ſtable, than thoſe who have been brought to a fire. Covering the parts with ſnow has had the ſame ſucceſs; whereas others have completed a gangrene by putting them into warm water or near the fire: But if, notwithſtanding theſe endeavours, a gangrene ſhould come on, we muſt have recourſe to thoſe chirurgical operations which will hereafter be deſcribed.

SIXTHLY, *Of a gangrene from a carbuncle.* Peſtilential buboes, and ſimple or malignant carbuncles, may be all ranked in the number of gangrenes; for the obſtruction in them increaſes ſo conſiderably in a very little time, and the obſtructed fluids putrify ſo faſt, that the whole adipous and cellular ſubſtances become putrid. *Vide my Obſervations*, p. 48.

THE ſkin which covers the tumor appears at firſt of a dark red in the middle, and a very full red at the circumference; a great heat alſo and burning pain are felt in the part affected, which proceed from the fermentation of the fluids that obſtruct all its veſſels; in ſhort, the ſkin mortifies quite through in a very little time, and likewiſe the adipous membrane underneath, unleſs relief be ſpeedily obtained by the aſſiſtance of ſurgery; for the beſt topics that can be uſed, will be of no manner of ſervice to prevent the ſpreading of the gangrene formed in the body of the tumor.

SEVENTHLY, *Of a gangrene proceeding from a phlegmon or eryſipelas.* The obſtruction may become ſo conſiderable, that the circulation in the part may gradually ceaſe. The fluids fermenting

require

require a larger ſpace to act in; and the ſkin, being of too cloſe a texture to yield immediately to their increaſed bulk, will compreſs the parts which it contains: hence the adipous parts mortify firſt, becauſe more liable to preſſure; and a putrid *ſerum*, proceeding from the fermentation of the obſtructed fluids, diffuſes itſelf over the limb. The ſkin becomes marbled, being in different places black, yellow, livid, pale, of a lively or deep red. The cuticle ſeparates from the ſkin, and riſes in little bliſters, filled with a reddiſh or blackiſh *ſanies*; after which the parts affected become inſenſible, and the redneſs, pain, and pulſation, are no longer to be obſerved or felt, except in the adjacent parts. If the patient continues ever ſo little a while in this condition, without proper remedies, the diſeaſe gains ground very faſt, and extends all over the limb. This is what is called a *ſphacelus*, which we can propoſe no other way of preventing, than by the method we have already pointed out to abate the inflammation.

If what we have propoſed, by way of prevention in theſe different caſes, ſhould prove ineffectual, and the gangrene begins to appear, we muſt endeavour to relax the ſkin, and diſcharge the putrid *ſerum:* This we may often do by proper inciſions and ſcarifications.

The ancients adviſe, at firſt, only ſimple punctures, which penetrate no further than the ſkin; but theſe are not ſufficient, and it is better to make inciſions both through the *membrana adipoſa*, and the *membrana communis muſculorum*. By this means two ends are anſwered at once, namely, the ſkin is relaxed, and a free diſcharge given to the putrid *ſerum*, which then paſſes out from cell to cell.

The figure of theſe inciſions cannot be determined where the gangrene affects any part of the trunk; all that can be adviſed is, to make them as far as the gangrene reaches. As to the gangrenes which ſeize upon any of the limbs, the inciſions there ſhould be made according to the direction of the limb. If it ſhould be one of the larger ſort, as the leg, arm, &c. the inciſions ſhould be about two inches long and an inch diſtant from one another. If it is neceſſary, others may be made below theſe, obſerving to make the upper extremity of the ſecond inciſion riſe about half a finger's breadth between the intervals of the former inciſions, and ſo on, if they are repeated lower down.

The depth of theſe inciſions ſhould reach to the quick, which you will diſcover by the patient's finding them painful; and they ſhould be carried lengthways into the inflamed part ſurrounding the gangrene.

If theſe methods ſucceed, the circulation becomes free, and a ſuppuration enſuing, gradually looſens the hardened eſchar. Nature is then to be aſſiſted by dreſſings with warm digeſtives; by the application of emollient and diſcutient fomentations all over the limb, which will invigorate the part affected; likewiſe by cataplaſms of the ſame kind, which, preſerving their heat longer, will give a general warmth to the whole member. As the eſchars ſeparate, they muſt be taken off, and the wound dreſſed according to the ſtate it is in.

If the gangrene degenerates into a *ſphacelus*, and is ſo ſituated that we are not under the neceſſity of amputation, or if amputation be not practicable; we muſt cut off all the mortified part, making our inciſions not only into the dead ſubſtance, but to the quick. We muſt likewiſe carry our ſcarifi-

cations

cations into the red inflamed parts surrounding the wound, or the gangrene may extend to them. If a limb is entirely mortified, it ought undoubtedly to be taken off; but in order to do this effectually, it will be necessary to make our incisions not only above the mortified part, but also higher than the inflammation which circumscribes it.

Of SUTURES.

THE healthy state of any particular part consists in the perfect structure of the vessels whereof it is composed, and in the just distribution of the fluids passing through them.

By wounds this exquisite mechanism is injured; in some of which the texture of the fibres is broke, contused, and to a certain degree destroyed, as in gun-shot wounds; in others, there is only a simple division of the vessels, without any loss of substance or destruction of the part affected, attended with a discharge of pure blood.

The only method by which we can restore the parts to their proper state, is by enabling nature to afford her assistance; as in contused wounds, by promoting the separation of the sloughs, without which the nutritive juice cannot form new flesh; and in recent wounds, by bringing their lips so exactly into apposition, that the nutritive juices, which ouze out of them, may effect their re-union; after which, the fluids will resume their usual course.

The lips of a recent, bleeding wound, always tend to a separation from each other; and therefore the first indication which art directs us to, is

to bring them together, and to preserve them in that situation. For this purpose two effectual means occur, namely, suture, and the uniting bandage; both which must be assisted by the position of the part affected.

If either the uniting bandage, or the dry suture, which likewise is a kind of bandage, are sufficient to keep the lips of a wound in their due situation, they ought to be made use of; that is, the uniting bandage to wounds made according to the direction of the fibres, whether in the trunk or extremities, even though made very deep; and the dry suture in all superficial wounds, whether longitudinal, oblique, or transverse: yet neither of these will avail in deep wounds that are either in a transverse or very oblique direction; but in such cases, a proper suture must be made with a needle and thread.

Of the dry Suture.

What the ancients have called a dry suture, ought not in reality to be termed a suture, as it is only the application of one or more adhesive plasters, so disposed, that being fixed upon the lips of the wound, after they are brought together, they are thereby prevented from separating again.

The form and number of these plasters must depend upon the situation and shape of the wound: The surgeons chief care in their application should be, *first*, To have the part clean shaved, as the plasters, sticking to the hair, would render it very difficult, and even painful to be got off. *Secondly*, The plaster applied must be very adhesive. The plaster of *Andreas a Cruce*, which is recommended for the dry sutures, or whatever other it be, if it

is newly made, will melt by the heat of the part affected, and no longer retain the lips of the wound. I have often obſerved, that almoſt any plaſters, if they are very old, will ſtick faſt, provided they are ſpread thin and on very coarſe linen. 3*dly*, Some ſmall portion of the wound ſhould be left uncovered by the plaſter at the moſt depending part, in order to reſerve a free paſſage for any ſerous matter, which may ouze out, and which, by being confined, might prevent the re-union, or looſen the plaſters by moiſtening them. 4*thly*, The plaſters muſt be made of a ſufficient length; for, if they are too ſhort, they will eaſily looſen, and not ſuſtain the lips of the wound.

Of Sutures with the needle.

A SUTURE is an operation in ſurgery, whereby the lips of a wound, made in a ſoft part, are ſtitched together.

THE different kinds of ſutures may be learnt from their uſes and the manner of making them. As for their uſes, we find three that are eſſential: The firſt is, to forward the ſpeedy re-union of the lips of a recent, bleeding wound, which is then called incarnative: The ſecond is, to ſupport and ſuſtain the lips of a wound which muſt digeſt, in order to prevent them from ſeparating more; and to this ſuture we ſhall give the name of contentive: The third is, to ſtop the hæmorrhages, by cloſing the mouths of any opened veſſels; and may be termed reſtrictive.

SUTURES differ likewiſe as to the manner of making them. The ancients uſed various kinds, which I think it needleſs to take notice of, and therefore

therefore ſhall only ſpeak of thoſe, of the uſe of which we are convinced by daily experience.

THESE are five; namely, the interrupted, the twiſted, the quilled, the looped ſuture, and the ligature.

THE interrupted ſuture retains the lips of a wound exactly brought together, and is therefore always to be uſed when we may expect a ſpeedy re-union. It is proper in ſlight, bleeding wounds, and where no large muſcles are intirely divided. We ſhall ſee, in explaining the manner of making this ſuture, that the threads with which it is made, exactly embrace the lips of the wound. The quilled ſuture, as it does not keep the lips of a wound ſo exactly drawn together, ought rather to be looked upon as contentive than incarnative; accordingly, it is not commonly made uſe of, unleſs for ſuch wounds as are very deep, and where ſtrong muſcles being entirely cut in two, their great ſeparation leaves no hopes of a ſpeedy re-union. In making this ſuture, therefore, we muſt diſpoſe the threads in ſuch a manner, that they may conduce rather to balance in ſome meaſure the force of theſe muſcles, than to draw the lips of the wound together.

THE twiſted ſuture retains the lips of a wound as exactly, when brought together, as the interrupted; and accordingly is incarnative. Nevertheleſs it is not always proper, and the ſituation and ſtructure of the part muſt determine us which ought to be preferred.

THE looped ſuture is only proper for wounds in the inteſtines. We ſhall ſee, in treating of wounds in the abdomen, where it will be neceſſary to ſpeak of this ſuture, that it is ſometimes incarnative, and ſometimes only contentive.

 To

To conclude, the ligature is ranked amongſt the ſutures, becauſe it is made with a needle and thread; but, in treating of the aneuriſm and amputations, it will appear, that it is only a preſſure fixed upon an open veſſel to ſtop the effuſion of blood.

THOUGH it was ſaid above, that a ſuture is only proper for thoſe wounds, whoſe lips, being brought together, cannot be kept in that poſition by a bandage; yet I never meant to affirm it was proper even for all ſuch wounds, ſince there may be ſome, where this operation would be abſolutely prejudicial.

IT would be improper in wounds made by the bite of any venomous or mad creature, as ſuch wounds ought to ſuppurate; nor ſhould it be uſed in contuſed wounds where the bones are much broken, becauſe of the laceration, and likewiſe the inflammation, which it is impoſſible entirely to prevent. The caſe is the ſame in gun-ſhot wounds, on account of the eſchar which cannot ſeparate but by digeſtion. It is alſo improper to uſe it when wounds are attended with great tenſion and inflammation, it being then impoſſible to bring the lips into appoſition.

THE ancients forbad making the ſuture in wounds where the bones are laid bare, imagining that every ſuch bone ought to exfoliate, though the wound proceeded from a ſharp inſtrument; but they were miſtaken in this particular; for we find by experience, that the ſuture is very proper in ſuch caſes to prevent the bone becoming carious: nay, though the bone itſelf ſhould be cut, if it was by a ſharp inſtrument, and is only a ſimple inciſion, the ſuture would ſtill be very proper; for the nutritive juices ouzing equally from the

bone

bone as from the flesh, without being at all corrupted, may form a *callus* there, as they do in a simple fracture. The amputation with a flap, which has succeeded very well, is a proof of what is here advanced; and in my *Chirurgical observations* you may read an account of an arm which I took off in the hospital of *La Charité*, where a proper care was taken to leave a sufficient quantity of flesh: This, being brought together with great exactness, was found, upon taking off the first dressing, to be closed over the bone, and probably united therewith, since the bone never appeared afterwards, neither did any exfoliation ensue. And the same success I have known after the amputation of a fore-arm.

THE ancients likewise forbad the use of the suture in contused wounds; but a distinction ought to be made between a great and slight contusion, and also whether or not the wound be complicated with laceration. If it is but slightly contused, the incarnative suture may be used; but if much bruised or lacerated, a suture barely contentive is necessary, in order to support the lips during the suppuration, and prevent a great loss of substance.

THEY prohibited its use likewise in wounds in the breast, because of the continual motion from inspiration and expiration. It is true indeed that, upon many accounts, it is not convenient for wounds that penetrate into that cavity; but if they do not penetrate, and a suture can be of any service, the dilatation which attends the inspiration, is not a sufficient reason to exclude the use of it; since it is possible to prevent this motion, which is but moderate, from straining the stitches so far as to hinder the re-union.

BEFORE

Before I enlarge upon the manner of making each of these sutures, I shall give some account of the instruments that are employed for that purpose, which are as follow:

Needles. These are of various kinds: some are straight, others crooked, and some but half curved. Of the straight needles, some are round from head to point, and others a little flat towards the point, and sharp on the sides. All those that are crooked should be flatted at their head. We suppose them formed of good well-tempered steel; and they ought to be very sharp on each side of the point; which point should be very fine, unless for some particular reason the edges are taken off, and the point blunted. As they have an eye to pass the thread through, there ought to be a groove on each side, sufficiently deep to lodge the thread in. Again, as the large needles are designed to make sutures in those parts where the muscles are very strong, the body of these needles should be of a sufficient thickness to allow of a deep groove; for if the several threads were not lodged entirely therein, they could not be passed through without great pain and laceration. The largeness of the body of the needle is no impediment to its passage through the parts.

Pins. These are used in the twisted sutures; and as they continue in the wound till the re-union is completed, they ought to be made of gold. Any other metal is subject either to rust or canker; but gold may be tempered like steel, and is not liable to these inconveniences. The point of these pins must be very fine, and their head of a moderate size.

A portaguille. This is but a useless implement, as the head of the needle is not sharp, nor is much force required to make the point of it

 enter.

enter. It is ſeldom made uſe of but to hold the couching needle.

The ancients uſed a *canula* either of a ſtraight or crooked form, that had a cleft or opening in it, to bear up the lip of the wound, through which the point of the needle is to paſs out, and to thruſt the ſkin againſt the point; but if the fingers will ſerve this purpoſe, they will do it both ſurer and quicker. The thumb and the fore-finger of the hand, which is not employed to hold the needle, are the beſt *canulæ* that can be uſed; and therefore this inſtrument is in moſt caſes needleſs.

Thread, ſilk, and lacing, or ſmall ribband. This thread ought to be ſtrong, even, and well wrought. It ought alſo generally to be waxed, to prevent its imbibing any moiſture, which might rot it. If ſilk is uſed, it ſhould be ſuch as is raw, or what has never been dyed. Flat lacing or ſmall ribband has one inconvenience; its edges are ſtiffer and more tight than its middle part, and therefore in ſuch caſes, where it might be of ſervice, it would be better to make uſe of three or four threads well waxed, laid cloſe together, and flatted. As to round lacing, it is not at all proper.

Neceſſary Rules to be obſerved in making the Sutures.

Supposing a wound to be recent, and free from any of the inconveniences beforementioned, and that we have determined upon making a ſuture, and what kind it ſhall be, the following particulars are then to be conſidered:

1. If an incarnative ſuture is intended, and there are extraneous bodies in the wound, they ought to be removed, as they would hinder the lips from being

being brought into contact, and consequently obstruct the re-union. Amongst these we may consider clotted blood.

2. The wound should be suffered to bleed sufficiently to empty the adjacent vessels; except in wounds that penetrate into the abdomen, where the blood might happen to run into the cavity.

3. If the lips of the wound are indurated, it is necessary to cut off the surface of them, to give passage to the nutritive juice which is to form the re-union. But if there is a laceration with contusion, this precaution is needless, as a contentive suture only is used in that case to support the edges, and prevent their separating farther.

4. We must either wait till the wound has done bleeding, or restrain the hæmorrhage by touching the lips with some slight styptic; such as white vitriol, powdered and wrapt up in a very fine rag. For want of this precaution, some blood passing out of the vessels, and stagnating between the lips of the wound, might prevent their re-union.

5. If the wound has one or more hanging lips of an irregular figure, the first stitch must be made at the angle of each lip; but if there are none of these, and several stitches are required, we must begin with that in the middle, unless in wounds of the abdomen, for reasons that will be mentioned in treating of the *Gastroraphy*.

Supposing the wounded member placed upon a horizontal plane, and the wound perpendicular; if it crosses transversly the line of the limb's direction, the entrance and going out of the needle should be at an equal distance from the edges of the wound, and the depth of the wound ought to be the measure of this distance; because the

 threads,

threads, when the ſuture is made, are to deſcribe a crooked line in the thickneſs of the fleſh: that is, if the wound is half an inch deep, the entrance and going out of the threads muſt be half an inch from the edges, and ſo in proportion. But the caſe will be different if the wound happens to be ſlanting, and forms a ſort of flap of one of the lips: Its bottom will not then be perpendicular to its entrance; and if the paſſage in and out of the threads were placed at an equal diſtance from the verge of the lips, the middle of the curve, which the thread ſhould deſcribe in the fleſh, would not be anſwerable to the bottom of the wound; neither would it ſupport it. In this caſe, therefore, the entrance of the firſt needle muſt be almoſt at the edge of that lip which does not form the flap, and it ſhould come out at the other lip which does form it, at a greater or leſs diſtance from the edge according to the depth of the wound. This done, the middle of the curve line deſcribed by the thread will anſwer to the bottom of the wound.

6. If a muſcle is entirely cut through, though it be obliquely, we muſt diſpoſe the points of the needles in ſuch a manner, that the threads may follow the ſame direction as the fleſhy fibres; otherwiſe the two parts of the muſcle would ſeparate notwithſtanding the ſuture, and would render it uſeleſs. For inſtance; a trooper has newly received a cut with a ſabre, in the middle and forepart of the thigh, which divides tranſverſely the extenſor muſcles of the leg; the threads which make the ſuture ought to be diſpoſed according to the length of the thigh, making a right angle with the lips of the wound. If the wound, inſtead of being tranſverſe, cuts the muſcles obliquely, the threads ought equally to be diſpoſed the long way of the thigh, which will be according to the direction of the

the muſcles; and then they will croſs the wound in an acute angle.

7. If it is a very deep wound, and it is neceſſary to make the quilled ſuture, there being no expectation of a ſpeedy re-union, the chief intention to be anſwered, is to ſupport the muſcular fibres which are neareſt to the bottom of the wound; and therefore the threads muſt paſs within the bottom of the wound itſelf.

The ſuture being made, the thread will neceſſarily deſcribe a ſemi-circle in the thickneſs of the fleſh, and the middle of this curve muſt anſwer to the bottom of the wound. The rule, before laid down, for the entrance and going out of the threads in the interrupted ſuture, cannot take place in this, but ſhould be made at a greater diſtance; for as the curve deſcribed by the threads when the ſuture is made, has always a tendency to become ſtraight from the contraction of the muſcles, the lips of the wound would be ſeparated from each other. This inconvenience may be prevented by making the entrance and going out of the needle at a greater diſtance; for the more diſtant they are, the leſs crooked will the curve be, and the leſs will the force of the muſcles be able to ſtraighten it.

8. Whatever ſuture is made, we muſt be cautious, while we introduce the needle, to avoid pricking any conſiderable tendon, nerve, or veſſel.

9. When the thread is paſſed, care muſt be taken to have the lips of the wound brought ſufficiently cloſe together by an aſſiſtant; after which the thread that is to hold them ſo, muſt be immediately faſtened.

10. We muſt obſerve alſo, that the knot be made at the leaſt depending part, that it may not imbibe

bibe any blood or matter, which, when they became dry, would render it hard. The first knot ought to be a single one, and over that a running knot to tie or untie occasionally.

11. When the interrupted suture is made, and there is reason to expect a discharge from the wound, a passage for it must be preserved at the most depending part, by leaving that less closed than the rest.

Several particulars are likewise necessary to be observed in regard to the dressings:

1. If the suture is only contentive, that is, to support the lips of a wound which must necessarily suppurate, digestives are to be used; or such other remedies as the case requires.

2. If an incarnative suture is made with an intent to procure a speedy re-union, we must avoid making use of suppurative medicines, and cover the wound with a linen rag dipped in some glutinous balsam; as balsam of Capivi, Canada, Peru, or any other that will prevent the air's penetrating to the sore, as it might corrupt the nutritive juices that are to produce the re-union.

3. It has been already observed, that at each stitch there must be a single knot, with another over it to tie or untie occasionally; and as this knot, should it imbibe any blood, would grow hard when dry, and be difficult to loosen, to prevent this inconvenience, it may be moistened with some oil, or pomatum, and covered with a small compress softened in the same manner.

4. When the suture is made, it is proper to assist the stitches by the dry suture; for want of which precaution, it has often happened, that the threads have cut through the skin, and the first suture been rendered useless.

5. If

5. If bandage can be of any ſervice to ſupport the lips of the wound, and ſtrengthen the ſuture, it ought to be applied; but as a ſuture is never choſen but when a bandage will not ſerve to keep the lips together, it ſeems to be uſeleſs. We may add yet farther, that it would rather obſtruct the re-union: For inſtance, in the wounds we have ſuppoſed in the thigh, a circular bandage would neceſſarily draw the angles of the wound near together, and the lips would be ſeparated; which is contrary to the intention of the ſuture. A rolled bandage therefore is not only uſeleſs but hurtful.

6. The part affected muſt be placed conveniently to forward the return of the fluids; it ſhould be laid ſoftly, to avoid giving pain, and in ſuch a poſition, that the muſcles upon which the ſuture is made, may be in a ſtate of relaxation. Another very eſſential circumſtance is, to have the part kept ſtill, otherwiſe the ſtitches would be ſtrained, the lips would ſeparate, at leaſt for ſome moments, and the nutritive juices no longer cohering between the lips in order to perform the re-union, would be converted into *pus*.

To theſe precautions muſt be added, a proper regimen, bleeding, and ſuch other remedies as are uſeful either to prevent the inflammation, or remove it, if it comes on; and (which ought by no means to be omitted) we muſt be careful to obſerve whether the wound grows inflamed, in order to judge, according to the degree of the inflammation, if it may be proper to looſen the ſtitches till that is abated.

It is alſo proper to take off ſome of the dreſſings at the end of twenty-four hours, that we may diſcover if any drops of moiſture are confined at the moſt depending corner, as their lodgment be-

tween the lips would prevent the re-union, and produce a ſuppuration.

When it is time to take out the threads, they muſt be cut at the lip oppoſite to the knot; then preſſing againſt the other lip with your finger, and looſening the knot, you draw away the threads without pain. But as the cicatrix is ſtill tender, it would be eaſily broke open, and therefore the part muſt be kept ſome days longer perfectly ſtill, and for the greater ſecurity the lips ſhould be ſupported by the dry ſuture.

In treating of wounds in the *Abdomen*, and of the *Gaſtroraphy*, I ſhall have occaſion to ſpeak of the looped ſuture: when we come to the article of the hare-lip, I ſhall deſcribe the manner of making the twiſted ſuture; and when we are treating of amputations, I ſhall mention the method of making the ligature. At preſent therefore, I ſhall begin the ſeveral operations with the interrupted and quilled ſutures.

Of the interrupted Suture.

The interrupted ſuture, as was before obſerved, is incarnative, and ſerves to retain the lips of a wound when brought into contact: it ought therefore to be uſed for recent wounds, which are not ſo deep as to divide large muſcles quite aſunder. Suppoſe, for inſtance, a tranſverſe or oblique wound made by the ſtroke of a ſabre in the fore-part of the thigh, which is three inches long and one deep: and where the extenſor muſcles of the leg are but partly divided. This wound requires nothing more than to be ſpeedily re-united, and we are ſure, by keeping the lips well cloſed, the nutritive juices, which iſſue thence, will anſwer this

this purpose. If the wound has done bleeding, I take a crooked needle, armed with two pieces of strong, waxed thread, and enter it into one of the lips within an inch of the edge. Where the length of the wound requires three stitches, I begin with that in the middle; was it somewhat shorter I should make only two, and so in proportion. If it has more than two angles, is of an irregular figure, and forms a kind of hanging lips, I first make a stitch at the point of each of these lips; and of whatever figure the wound is, the direction of the stitches should always answer as much as possible to the direction of the muscles that are cut. I pass the needle deeper than the bottom of the wound, and bring it out at the other lip, about an inch from the edge, so that the thread incloses all the divided flesh. I then make two other stitches in the same manner; which done, the two lips are to be brought exactly together by an assistant, and preserved in that situation by tying the two ends of each thread on the superior lip.

The wound is to be covered with a piece of linen rag dipt in some glutinous balsam, to prevent the air from penetrating, and thereby corrupting the nutritive juices.

I afterwards strengthen the stitches by supporting the lips with a dry suture, which we make with slips of linen spread with sticking plaster, of a breadth proportionable to the spaces between the threads, and about five or six inches long: these we fix upon the skin between the stitches, so that they support it, and hinder it from receding.

The whole dressing consists of two compresses, namely, one to cover the wound, and another which goes round the limb, and is fastened with pins.

The situation of the part ought also to correspond in answering the intention of the suture; for which purpose, we extend the leg in such a manner, that the muscles which have suffered, may be relaxed; and then fix it in this posture, that no unforeseen accident may displace it.

We must endeavour, likewise, by a strict regimen and bleeding, to prevent an inflammation of the wound, or to remove it if it supervenes, by the application of anodyne cataplasms; and if, notwithstanding the use of these means, the inflammation should become very considerable, we must loosen the stitches; which would then be only contentive, as the wound will necessarily suppurate.

But, supposing this should not happen, the dressings ought not to be taken off till about the fourth day, and then with great caution, to prevent straining the part; and the stitches should remain in till the skin is healed. The use of the dry suture should be continued some days after the threads are removed, and the limb left in the same posture to allow the cicatrix to harden; especially that which is formed in the muscular parts.

Of the quilled Suture.

In order to explain the quilled suture, we will again suppose a wound in the forepart of the thigh; and, to render it more instructive, let us suppose it in a slanting direction, making a kind of flap of one of the lips, and the wound oblique and complicated with an extraneous body, namely, part of the edge of the sabre which remains in the fleshy part of the thigh. In dressing this wound, wherein great part of the extensor muscles of the leg are divided, we may apply almost all the general rules before

before laid down concerning the making of futures.

It is in vain to think of bringing the lips of fuch a wound together, and confining them fo by bandage. It will be neceffary therefore to make one or more futures, and the moft proper upon this occafion will be the quilled: firft, becaufe the wound is too large to re-unite without fuppuration; fecondly, becaufe the figure and depth of it will not admit of the interrupted future. The bone being wounded, as has already been obferved, would be no obftacle to the re-union either of that or the flefh; but as the extraneous body might, we muft begin by extracting that, and be careful not to leave the leaft part of it. If it fticks in fo faft as not eafily to be taken out with the forceps, we muft fcrape away fome of the bone either with a fmall gouge, or a fine file, directed along by the extraneous body, in order to enlarge the place wherein it lies, and to extract it with more eafe. The furgeon's own judgment will direct him how to make fuch alterations in this method as he finds neceffary.

In order to perform this operation the more conveniently, and with the greater fafety, it would be proper to feparate the lips of the flefhy wound by extending the patient's thigh and bending the leg.

The extraneous body being removed, the wound fhould be wafhed with warm wine, to cleanfe away the clotted blood; and if it ftill bleeds, we muft either wait till it ftops of itfelf, which it will frequently do in a few minutes, or fupprefs the bleeding by touching the lips with a little bag of white vitriol calcined.

The next thing to be done is to make the future, but firft we muft extend the patient's leg, in order

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to relax the lower parts of the muſcles and bring the lips of the wound near each other. Whilſt an aſſiſtant with both his hands brings the lips together, I prepare a crooked needle of a ſufficient length, armed with two pieces of waxed thread, whoſe four ends are joined together by one common knot. I introduce the point of this needle at the lip oppoſite to that where the flap is ſituated, and exactly at the edge of the wound. Then directing the point ſo that it paſſes to the bottom of the wound, I carry it through the thickeſt part of the other lip, till it comes out at three or four fingers breadth from the edge of the flap, more or leſs, according to the thickneſs of the fleſh; I take care alſo to paſs the threads according to the length of the limb, as if the wound was tranſverſe; contriving ſo, that the middle of the curve, deſcribed by the threads when paſſed, is exactly at the bottom of the wound. Having made the firſt ſtitch at the middle of the wound, I add, if neceſſary, two others, one on each ſide; and then place a roll of waxed linen, about the bigneſs of a quill, through the loops made by the joining of theſe threads at every ſtitch. This roll, which ſerves inſtead of a quill, fixes the ends of the threads in ſuch a manner on this ſide, that it bears up one of the lips of the wound. After this, I cut the threads near the head of each needle, and every ſtitch conſiſting of four threads, I range them two and two together, placing between them another roll of waxed linen, like that we uſed at the former lip; I then join them by a knot over the roll, ſo that both lips of the wound are ſupported. The firſt knot of each ſtitch is to be a ſingle one, ſecured by a running knot over it, that it may be looſened at pleaſure; and the knots are to be placed upon the ſide of the flap, to pre-

vent as much as poſſible their being moiſtened by the *pus*.

It now remains to take care of this flap formed by one of the lips of the wound, for the ſuture fixes that but imperfectly, being chiefly deſigned to bear up the body of thoſe muſcles, the divided parts of which ſeparating very much, would make a gaping wound. This may be done by two ſticking plaſters, laid between the ſtitches, and forming what is called the dry ſuture.

We then moiſten the knots with a little oil, or pomatum, to prevent their growing hard, and cover them with a ſmall compreſs ſoftened in the ſame manner.

There is no room to hope that ſuch a wound will unite without coming to digeſtion, at leaſt ſome ſerous matter will ouze out, which ſhould not be ſuffered to continue in the wound; and upon this conſideration we ought not to make uſe of any glutinous balſam, but only apply ſome dry lint or linen upon it, to abſorb the diſcharge.

A circular bandage would be quite improper in this caſe, as it would draw the corners of the wound near each other; for which reaſon a circular compreſs looſely put on and faſtened with pins to keep on the dreſſings, will be all that is neceſſary.

The patient's leg ought to continue extended, and for the greater ſafety it would not be amiſs to ſecure it in that poſture: as the leaſt flexion would in all probability ſtrain the ſtitches and bring on an inflammation; a ſymptom which was too much to be apprehended before. Should this happen (from whatever cauſe it may proceed) notwithſtanding the low diet and frequent bleedings which ought in ſuch caſes to be uſed for prevention, and ſhould it increaſe conſiderably, the ſtitches muſt be looſened

loosened and drawn tight again when the inflammation is gone off.

The wound must be dressed according to the condition it is in; and if the lips can be kept thus fixed during the formation of new flesh, it will be a great help to nature.

Of the Suture of a Tendon.

Having thus described the quilled suture, I proceed next to speak of the suture of a tendon; the quilled suture being proposed by authors to be made use of in the re-union of divided tendons. But let us here recollect what has been before observed, namely, that when we can bring together the divided parts, and keep them in that situation by bandage and a proper position of the limb, we ought never to make use of sutures.

This being granted, there will never be any necessity to use a suture for divided tendons, as the situation of the part will bring the ends together. For instance, if the extensor tendons of the fingers are divided, it will be sufficient to place the limb in a box, and to fix it there in such a manner that the wrist be turned back and the fingers extended. By this means we may bring the ends of the divided tendon exactly into apposition, and even to wrap over one another, if the extension be made to a certain degree. The hand and fingers are afterwards to be kept in the same position; by which the re-union will be effected, and the wound in about three weeks consolidated: And how could the suture answer the purpose better?

If a tendon is cut, the ends of which cannot be brought together and kept in that state by the situation of the limb, the suture will then be useless. If there is any case where it can be proposed, it is, when

when a tendon has been cut for ſome time, and the part not having been put in a proper ſituation, the contraction of the body of the muſcle has ſo ſeparated the divided parts, that they cannot be brought together by any particular poſition. But even in this caſe the ſuture would be of no ſervice, ſince the intention of it is not to draw the divided parts together, but to keep them cloſe when they are ſo; and this cannot be done here, becauſe the ends of the tendon have united themſelves with the adjacent fleſh. To conclude, though the ſuture of a tendon has been recommended, and practiſed by the ancients, and even by eminent modern ſurgeons, I look on it as an operation which ought not to be uſed, and therefore ſhall not deſcribe it. The frequent experience I have had of the re-union of tendons, both broken and cut, even of the *tendo Achillis*, which has been procured only by the ſituation of the part and a proper bandage, ſufficiently convinces me that the ſuture of tendons is unneceſſary.

Of WOUNDS in the ABDOMEN, and of the GASTRORAPHY.

WOUNDS of the *Abdomen* may be divided into ſuch as are either ſuperficial, or penetrate into the cavity. I ſhall paſs over thoſe that are merely ſuperficial, as they are in no reſpect different from ſlight wounds in other parts.

OF ſuch as penetrate into the cavity, ſome are ſimple, others complicated. I call thoſe ſimple, wherein none of the parts contained in the cavity are either hurt or forced out; and even where ſome

of them do appear out of the wound; if it is sufficiently large to admit of their being easily reduced without an incision, I still consider it as a simple wound. I call those wounds complicated, wherein some of the *viscera* are hurt, or where some of them, whether hurt or not, are protruded, so as to require the wound to be enlarged in order to make the reduction; besides which, there may be several sorts of complications in these wounds.

There are wounds which visibly penetrate into the cavity; for instance, those where some of the *viscera* issue out, or such as are large enough to admit a finger, or at least a probe, into the belly, without difficulty. There are others, which are so small, that, notwithstanding all possible care to place the patient in the same posture he was in when he received the hurt, the probe cannot be introduced; which makes it difficult to determine whether the wound penetrates into the cavity. In this case the wound either does not penetrate, or, if it does, it is without affecting any part internally; or it does penetrate, and is complicated with a hurt of some of the *viscera*: All which differences ought to be well considered by the surgeon, that he may apply himself to the proper method of cure which these different circumstances of the case may require.

If the wound does not penetrate into the cavity, it differs not from slight wounds in other parts, and therefore requires no particular directions about the treatment of it.

If it does penetrate into the cavity, but without injuring any of the *viscera*, even though some of them should be protruded, it ought to be dressed as a simple wound, and when the parts are reduced, requires a speedy re-union.

At the ſame time the ſurgeon ſhould enjoin the patient a very ſtrict diet, and take away a ſufficient quantity of blood; for the muſcles of the *abdomen* being in a continual motion from the action of reſpiration, *viz.* alternately extended and contracted, there is room to apprehend an inflammation of the *peritonæum*, which lines the internal ſurface of the cavity.

I have before obſerved, that the re-union ought to be endeavoured as ſoon as poſſible; but if a ſmall wound is made through one of the *muſculi recti*, we muſt deviate from this rule, and by an inciſion enlarge the opening of the ſkin, fat, and ſheath, that covers this muſcle; the inteſtine having been frequently known to be ſtrangulated in ſuch wounds, and to produce a *hernia* between the muſcle and that part of the ſheath which paſſes underneath it; while the ſmallneſs of the outward opening prevented its being diſtinguiſhed. Theſe herniæ are attended with ſuch ſymptoms as make it difficult to determine from what cauſe they take their riſe. The inciſion that I propoſe in ſuch a caſe does not hinder the re-union of the bottom of the wound, but rather promotes it, by giving a free paſſage to the *pus* which may be collected amongſt the teguments.

Wounds that penetrate, and are complicated with a wound of ſome one of the *viſcera*, require a dilatation of the external orifice, inſtead of a ſpeedy re-union, and alſo different precautions according to the nature of the part injured. The ſurgeon therefore muſt endeavour to diſcover which is the part affected: and this he may do, by rational indications, drawn from the ſituation of the wound, the nature of the pain, the function injured, the excretions or the diſcharges from the

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wound, and the ſymptoms proper to wounds of the ſeveral *viſcera*.

If the wound is in the *epigaſtrium*, or the left *hypocondrium*; or, though differently ſituated, if the oblique direction of it tends towards one of thoſe regions, we may ſuſpect the ſtomach to be hurt. The pain in this caſe will be violent; eſpecially if the wound be near the upper orifice, and may be attended with frequent convulſive reachings. If the ſmell of liquors which the patient has lately taken, or any aliment, iſſue from the wound, it is a certain indication of ſuch an accident.

As the liver poſſeſſes the whole cavity of the right *hypocondrium*, it is probable that may be injured, if the wound penetrates there; and as its middle lobe advances into the *epigaſtrium*, it may alſo be hurt if the wound penetrates into this region. The liver is not very quick of ſenſation, and therefore may be wounded without our being made immediately ſenſible of it by any violent pain; but though the pain may be ſlight at firſt, it may grow very ſevere ſoon afterwards, by the inflammation of its external membrane. It is obſervable, that notwithſtanding a great deal of blood paſſes through this gland, yet as the texture of it is cloſe and compact, it ſometimes diſcharges but little blood, even from deep wounds made in it. To conclude, the liver may be rendered incapable of performing its offices; that is, the ſecretion of the gall may be ſuſpended by the inflammation, which will prevent the chyle's being perfected in the duodenum. This may be diſtinguiſhed by the excrements not being tinged with bile.

We may have reaſon to ſuſpect the gall-bladder's being hurt from the ſituation of the wound

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and its direction; but if bile is discharged at the wound, you may certainly determine that to be the case.

If the wound is in the left hypocondrium, and attended with an hæmorrhage, there is reason to apprehend the spleen is wounded: but this is generally so violent, that it hardly allows time for the application of any remedies, unless the wound be superficial.

If the direction of the wound should tend towards the *diaphragm*, it is probable that may be affected, and the pain will then be more or less acute, according as the wound has penetrated either into its fleshy or tendinous part, in the last of which it would be most violent. The respiration, whereof this is one of the principal instruments, would in such a case be difficult, interrupted and convulsive; the patient would also be affected with an involuntary laughter, called the *risus sardonicus*, which is a convulsion, almost inseparable from wounds in the *diaphragm*.

If the mesentery is wounded at its centre, or towards its narrowest part, where it joins to the vertebræ of the loins, and where the plexus mesentericus is placed, the accident is hardly distinguishable but by the acuteness of the pain. The inflammation of this part may extend to the intestines, and cause a suppression of the *fæces*, with vomitings.

All wounds penetrating the belly, in whatever region they happen, may be so directed as to affect some of the intestines, because they fill up the greatest part of its cavity; and this cannot be discovered, unless some excrement issues through the wound, or blood be discharged with the stools. An inflammation of the *canalis intestinalis* and a *nausea*,

are ſymptoms which conſtantly attend ſuch an accident; but as theſe ſymptoms may happen without the inteſtinal canal being injured, they are but uncertain ſigns.

If the kidney is injured, the ſituation, or at leaſt the direction and depth of the wound, may give room to apprehend it; but the proper proofs of it will be the ſeat of the pain, and a diſcharge of bloody urine.

The bladder may be hurt at its *fundus*, or towards its neck, of which we may form ſome judgment from the ſituation of the wound and its direction. If the wound, entering above, tends downwards, and piercing the membrane that covers the bladder in the *pelvis*, opens it at the *fundus*, the urine may then run into the belly; and being no longer confined in the bladder, the patient will not have any inclination to make water. If it be opened in the neck, ſome urine will paſs through the wound, and if any comes through the *urethra* it will be bloody, ſuppoſing the wound to have been made by a ſharp inſtrument.

If any large blood-veſſel be opened in the cavity, death will ſpeedily enſue; if a ſmall one, but ſuch a one as conſtantly keeps diſcharging, the patient will grow weak, and ſink into frequent faintings. See my *Obſervations*, p. 300.

The ſeveral caſes before-mentioned require particular attention: and in all of them we cannot be too careful to keep under the inflammation, this ſymptom being the ſource of a thouſand other accidents; and was it always poſſible to moderate that, there would be very few wounds which would not heal. In all theſe caſes then, for I muſt repeat what I have ſaid before, far from thinking of a ſpeedy re-union, we muſt, on the contrary, enlarge

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the opening of the ſkin and fat, to give a free paſſage to the matter or whatever elſe may iſſue from the parts wounded.

I NOW proceed to the wounds that penetrate, and are complicated with the protruſion of ſome of the *viſcera*.

THERE are but three of theſe that can iſſue from the belly through a wound, which are the ſtomach, the *epiploon*, and the inteſtines; and theſe may paſs out either ſingly or together. The parts which are forced out thus, may be ſound and in a good ſtate, or they may be wounded or diſordered. In all theſe caſes the wound is either large, and will admit of the reduction without difficulty, or it is ſmall, and the protruded parts are ſtrangulated in ſuch a manner as to hinder their being reduced; and each of theſe ſymptoms requires a different method of treatment.

SUPPOSING the wound large, and the protruded parts ſound, they muſt be reduced as ſoon as poſſible. It is not uncommon for them to be found cold, and covered with duſt, or blood; in which caſe, before the reduction is made, they ſhould be waſhed with ſome warm liquor; and as urine is always at hand, it may very well ſerve for this uſe. As to the parts themſelves, we muſt treat them according as their different appearances, which we are next to take notice of, ſhall require.

IF ſome of the *viſcera* puſh out through a ſmall wound, we muſt treat them according to the nature and condition of the parts.

WHEN the *epiploon* alone paſſes out through a ſmall wound, it will be ſtrangulated, and the teguments of the abdomen, making a kind of ligature round it, will become tighter in proportion, as the wound cloſes. In this caſe, we might cut

off the *epiploon* cloſe to the ſkin, without making a real ligature upon it; but it would be much better not to do ſo, as that part of the *epiploon* which fills up the wound, might retire into the belly and leave the wound open; and as the lips of a wound in the *peritonæum* will not unite with each other, the opening which it leaves under the teguments might afterwards give occaſion to a *hernia ventralis*: it is better, therefore, not to cut it till the part that appears out begins to decay: this might give time to that portion of the *epiploon* which fills up the wound in the teguments, to adhere to them, and thereby prevent the *hernia ventralis*.

The inteſtine iſſuing out of the wound may be found in three different ſtates; and to ſet this in a clear light, I will ſuppoſe three men to have each received a thruſt with a ſword that has entered the abdomen: that all the three wounds are very ſmall, and that in each of the three, part of the inteſtine and *epiploon* appear.

In the firſt, the inteſtine is wounded, notwithſtanding its projecting out of the belly (undoubtedly becauſe it received the injury after its coming out, for an inteſtine that is wounded while in the *abdomen* will not come out unleſs the wound be large). In the ſecond, the parts are ſtrangulated, and the inteſtine gangrened, in conſequence of the continued ſtrangulation. In the third caſe, the inteſtine is not wounded, but the parts are ſtrangulated in ſuch a manner, that the inteſtine is puffed up, and ſpreads over the external orifice, ſo as to prevent our conveniently ſeeing the opening through which it paſſed. In theſe three caſes, the ſurgeon ought to dilate the wounds of the teguments as ſoon as poſſible, to take off the ſtrangulation, which having ſuſpended the courſe of the fluids

in the parts that are forced out, has occasioned the inflation, inflammation, and gangrene; we must deviate therefore from the general rule, which directs us to prepare every thing ready for the operations and dressings before we begin to operate; and, in order to perform our work conveniently, the patient must be placed upon his back, with his breast and knees a little raised, that the teguments of the abdomen may be the less upon the stretch.

In whatever region of the belly the wound is, and however its direction may tend, it is almost always proper to make the dilatation at the inferior angle; and as the intent of dilating it is to reduce the parts, the incision must be made proportionable. It is better, however, that it should be too large than too small, that the intestine may not suffer in being returned into the belly.

If the wound penetrates one of the *musculi recti*, the skin causes a strangulation in the first place; and it is not impossible, but the tendinous sheath of this muscle may produce a strangulation under, and upon the muscle; but if the wound be situated elsewhere, the skin alone will cause the strangulation, for the *peritonæum* scarce ever does. In which case, we must first divide that only, without touching the *peritonæum*; and upon this account I should reject the method hitherto proposed by authors, to dilate the whole wound.

In whatever part of the belly we are obliged to make the opening, we introduce a director under the skin, taking care not to let it pass into the cavity; then sliding a straight *bistory* along the groove, we make a sufficient opening in the skin to admit a finger with ease; which is generally large enough to allow of the reduction. If the

wound is not made in one of the *musculi recti*, we then examine with the finger whether the *peritonæum* makes any resistance, or suffers us to introduce it into the belly; for in the last case it would be needless to carry the point of a bistory into the cavity, where it might happen to wound the intestine.

If the wound is in one of the *musculi recti*, I introduce my finger to the bottom of it, and feel whether the *aponeurosis* is sufficiently divided by the instrument that made the wound, and whether it can obstruct the easy reduction of the parts. If it does obstruct the reduction, the finger that is in the wound, serves instead of the director; so that passing the back of a bistory along this finger, till the point of it is advanced as far as the second strangulation, it is easy to divide it without being obliged to carry the point into the belly. When the intestine is found, it is sometimes so filled and distended with wind, that it covers the wound, and makes it difficult to discover its situation; and yet it is necessary, in this case, to dilate the wound; and in order to do that, if we cannot introduce the director, we cover the protuberated intestine with the hand, and conveying the fore-finger of the same hand underneath it, we put the edge of the nail even with the wound, in order to guard the intestine; then introducing, by the help of this nail, a blunt-pointed, crooked *bistory*, we dilate the orifice of the wound sufficiently to pass in the probe easily. This done, we continue the dilatation, and immediately introduce the fore-finger, to feel whether the *peritonæum* is opened enough to admit of the reduction; if it is not, we dilate the wound in the *peritonæum* with the end of a blunt-pointed

bistory,

biſtory, conducted along the fore-finger; for want ef which dilation we might ſeparate the *peritonæum* from the muſcles in reducing the inteſtine. In this method, we run no riſque of injuring the inteſtine by dilating the wound, which is an accident that might happen in following the method deſcribed by authors.

THE ſtrangulation being removed, let us next ſee whether the parts muſt be reduced; and here the inteſtine firſt demands our conſideration. If it is diſtended, it is certainly neither hurt nor gangrened, as this appearance of it proceeds partly from the obſtruction of its veſſels, and partly from the wind which fills its cavity.

As to the wind, we muſt firſt endeavour to move it back into that part of the inteſtine which remains in the belly, by gently preſſing the protruded part with the fingers. This precaution is very neceſſary, as the inteſtine might otherwiſe ſuffer greatly, and be bruiſed in reducing it. The inflammation will require ſome time to go off, and therefore the reduction muſt be made directly, the natural heat being of great ſervice, and more efficacious than all the topics that can be applied. In order to reduce the inteſtine, we move it into the belly with the two fore-fingers alternately; putting that part of it in firſt, which came out laſt, and taking care not to bruiſe it. The inteſtine being reduced, we are to puſh it gently beyond the orifice with the finger that conducted it thither.

THE inteſtine may be wounded, either with, or without loſs of ſubſtance. When there is only a ſimple inciſion, we muſt make the looped ſuture in it, before we attempt the reduction. The texture of the inteſtine is too thin to admit the

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lips of a wound in it to re-unite one with the other, as is uſual in wounds of the fleſh, and therefore a wound in the inteſtine cannot heal but by adhering to ſome neighbouring part, or by its internal coats being preſerved in contact with each other after a ſuture has been made, and uniting together, as we often ſee parts adhere by a ſlight inflammation; for inſtance, the adheſion between the inteſtine and the *peritonæum* that ſometimes happens in *herniæ*. Now, in order to promote this adheſion of its coats, ſuch a ſuture muſt be made as will not ſuffer them to ſeparate from each other; and this is done by the looped ſuture, which I think preferable to that commonly propoſed by authors, termed the glover's ſuture.

It may be aſked whether a ſmall wound requires any ſuture, and whether the exact diet which the patient ought to obſerve, is not alone ſufficient to produce a re-union; and the rather as there ought not to be chyle enough in the inteſtines to occaſion a diſtenſion of their coats; but we ſhould certainly find, that, when the chyle is wanting, the wind will diſtend them; conſequently it will be better to make a ſuture that may perhaps be needleſs, than to neglect doing it when neceſſary. It is true indeed, patients have been known to recover, whoſe inteſtines have been wounded by the thruſt of a ſword, without any ſuture being made, becauſe they never appeared out of the belly; but all have not been thus cured, which may probably be owing to the impoſſibility that there ſometimes is in making the ſuture.

In order to make the looped ſuture, an aſſiſtant takes hold of one end of the wound, whilſt the ſurgeon does the ſame at the other, and the needles,

needles, which ſhould be round, ſtraight, and ſmall, carrying each of them a thread a foot long, and not waxed, muſt be equal to the number of the ſtitches intended to be made. I then paſs through both lips as many threads as are neceſſary, taking care that they are a quarter of an inch, or thereabouts, diſtant from each other. All the threads being thus paſſed, I draw away the needles and firſt tie together the ends of the threads on one ſide, and then do the ſame on the other; after which, joining them together, I make a ſort of a cord, by twiſting them twice or thrice round. By this means we purſe up the divided parts of the inteſtine into a kind of pucker, ſo that the ſtitches, which before were diſtant about a quarter of an inch, are now brought cloſe to each other, and thus the lips of the wound, being prevented from ſeparating, produce an adheſion without the inteſtine's being obliged to unite itſelf to any other part.

The ſuture being made, the aſſiſtant is to hold the two ends of the twiſted threads, whilſt the ſurgeon performs the reduction of the inteſtine, as was before directed.

If the inteſtine is wounded with a ſmall loſs of ſubſtance, we uſe the ſame ſuture; but if the loſs be conſiderable, two or three threads muſt be paſſed through in the nature of a loop, to keep it fixed at the moſt depending part of the wound; to the end, that if any chyle, or matter, ſhould iſſue from it, they may not be diſcharged into the belly.

If the inteſtine is black and mortified, it would be dangerous to reduce it in ſuch a ſtate as the natural heat cannot cure a *ſphacelus:* it can only ſeparate the mortified part from that which

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is found, which it will do in about six or eight days, when the intestine being open, the chyle, or excrements, would be diffused within the cavity. To prevent this inconvenience, we must anticipate the operation of nature, by cutting off the part that is mortified, and then fix the open intestine, by one or more stitches of the looped suture, at the lower part of the wound, as we before advised when speaking of a wound of the intestine attended with loss of substance.

If part of the stomach appears without the wound, as it is possible it may do, it requires the same manner of treatment as has just been directed for the intestine.

Sometimes part of the *epiploon* may come out with these, which if it be found, and the wound large, though it should begin to grow cold, must be immediately returned into the belly again, as the natural heat will assist greatly to restore its warmth, and renew the circulation which had been suspended in it. But if this portion of the *epiploon* be either gangrened, or disposed to gangrene, which may be known from the alteration of its natural colour, it must be cut off. In order to do this, I quit the lips of the wound for a moment, which must be so held together by an assistant as to prevent the intestine pushing out any farther; and if the gangrene has seized upon so much of the *epiploon* as lies out of the abdomen, we must draw out a little more of it till we discover the sound part, through which we are to pass two pieces of waxed thread, making a tight ligature of each, and cut off what is mortified about a finger's breadth below. This ligature must be fixed at the most depending part of the wound, not in the *abdomen*, but to the teguments, in such a

manner as to ſtop the orifice, and prevent the inteſtines puſhing out again. By this means the part of the *epiploon* that is tied, being ſeparated by the digeſtion, will come away with the ligature, and cannot poſſibly fall into the cavity.

HAVING now anſwered the firſt curative intention, by reducing the parts, we are next to perform the ſecond, by a ſuture called *gaſtroraphy*, which is termed ſo not on account of the manner of making it, but becauſe it is uſed for the belly. By this ſuture we ſew and keep cloſe together the lips of the wound in the teguments, ſo as to prevent them from ſeparating, and thereby hindering the reduced parts from coming out again. This is done by the interrupted ſuture.

IT is proper to obſerve here, that this muſt never be uſed but in thoſe caſes, where, on account of the largeneſs of the wound, we cannot diſpenſe with it; for as this ſuture muſt neceſſarily ſtrain the *peritonæum* and the ſkin, and as this ſtraining will be painful, and ſubject to produce an inflammation; if the parts can be kept within the belly by any other method, it ought to be preferred. It was to prevent, if poſſible, making uſe of this ſuture, that in dilating the wound I recommended only ſuch an opening to be made as was juſt ſufficient to reduce the parts, and no more. If an inciſion about an inch long is ſufficient for the reduction, the *gaſtroraphy* would be unneceſſary; and provided care is taken to retain the parts, ſo as they may not burſt out again, the wound will heal as well as if the ſuture had been made. Suppoſing, however, it ſhould be neceſſary to perform this operation, the number of the ſtitches muſt be more or leſs, according to the ſize of the wound, and made two thirds of an

an inch from each other, and from the angles of the wound.

Though, in making other futures, if feveral ftitches are required, we begin with the middle one, yet in this fort of future, we are to begin by making the firft ftitch neareft to the fuperior angle, proceeding to the reft afterwards. It will be neceffary, in making each ftitch, to have two crooked needles, armed with the two ends of the fame thread formed of three or four pieces well waxed and joined together. The interrupted future is preferred, as procuring the quickeft re-union.

Supposing the future made in the inteftine, and the ligature on the epiploon, we immediately place the threads of thefe futures in a proper manner. If the future of the inteftine is defigned only as incarnative, with intent to procure the re-union, we take care to place the threads at the fuperior angle of the wound before we make the firft ftitch in the teguments; but if a contentive one only, as in the cafe of lofs of fubftance, or a gangrene, we place them at the moft depending angle; where we likewife fix the ligature of the *epiploon.*

Whilst an affiftant keps the threads in the fituation I had placed them, I introduce the end of my fore-finger of the left-hand into the belly, and taking one of the needles, with the thumb and fore-finger of the right-hand, I lean the crooked part upon the finger which is in the belly, fo that the point is in a manner funk in it. This finger then conducts the point of the needle without danger of pricking any of the *vifcera*, and fixes it on the infide of the belly in the thickeft parts of the teguments, in order to pafs it from thence to the outfide. Upon this, the head of the needle

needle being received into the palm of the left-hand, is kept fixed by the other four fingers, while with the right hand I preſs the ſkin againſt the point of the needle, that it may paſs the more eaſily. At the ſame time I puſh on the head of the needle with the palm of the left-hand, and draw out the point with the right. This done, without taking the fore-finger of the left-hand out of the belly, I turn it towards the other lip of the wound, and taking the other needle, threaded with the ſame thread as the former, in my right-hand, I fix the point again upon that finger, as was done for the other lip; and the finger, ſerving to guide the needle ſafely as before, helps it to pierce the teguments on the inſide of the belly, at the ſame time that the left thumb preſſes the ſkin againſt the point, that it may paſs the eaſier. After this, without drawing the fore-finger out of the wound, I make a ſecond, and third ſtitch, if neceſſary.

THE threads being all paſſed, I take away the needles to make the knots; and ordering an aſſiſtant to bring the lips of the wound together, I faſten the ſtitches one after another, beginning at the middle one if there are three, and at the uppermoſt if there are but two. I then make the ſurgeon's knot, and afterwards a ſlip or bow knot, that we may looſen the ſuture, ſhould it become too tight by the tenſion of the belly. Theſe knots ſhould be made at the leaſt depending part, that they may be ſecured, as much as poſſible, from any moiſture which may diſcharge from the wound. I then moiſten the knots with oil, or pomatum, and lay over the wound a bit of linen ſpread with ſome glutinous balſam, obſerving all the precautions mentioned in the article of ſutures. Having afterwards covered the whole with ſuffi-

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cient compreſſes, I next apply an uniting bandage made with a napkin, which is to be ſo placed as to go round the body, and have its two ends brought to meet on one ſide of the wound.

I DO not offer to direct any particular ſituation for the patient, well knowing that the moſt commodious will grow inſupportable in time; but leave him at liberty to chooſe, ſometimes one, ſometimes another, taking care only not to lie upon the belly. But, in order thus to change his poſture, it is of great conſequence, that he does not at all endeavour to help himſelf; for the muſcles of the *abdomen* contracting themſelves upon the leaſt effort, would ſtrain the ſtitches of the ſuture, which might inflame the lips of the wound. The patient therefore ſhould be moved by ſome other perſons, who are ſtrong and handy.

WE muſt leave it to nature, to direct us when to take away the ligature and the ſtitches. The ligature of the *epiploon* ſhould bring with it that part of the *epiploon* which it has ſeparated from the quick, and this cannot all come off but by ſuppuration; we muſt now and then examine, therefore, by pulling the thread a little, to ſee whether it grows looſe. Sometimes it happens, that this ligature looſens by the ſhriveling of that part of the *epiploon* which it incompaſſed, and falls off before the ſuppuration has quite divided it from the ſound part.

As to the ſtitches made in the wound of the teguments, they muſt remain till we find the ſkin perfectly cloſed; and then they are to be drawn away, as has been before directed in the general article of ſutures.

WHEN the ſkin is cicatrized, the ſuture made in the inteſtine may be removed without danger; and in order to do this eaſily, the threads ſhould be

be untwiſted and then cut off cloſe to the cicatrix, on one ſide only; after which, each thread is to be drawn away ſeparately.

Though the ſtitches made in the teguments paſs through and include the *peritonæum*, as well as the muſcles and the ſkin, we may be aſſured the re-union is not formed in that as it is in the other parts; for whatever care is taken to bring together the lips of a wound in the membranes, and to keep them ſo, they never unite together: thus the *peritonæum*, in wounds of the *abdomen*, unites and cicatrizes only with the fleſhy fibres of the abdominal muſcles, to which it is joined by a very thin cellular ſubſtance; whence it ſometimes happens, that this part is afterwards ſubject to a *hernia*.

It now remains to anſwer the third intention of cure; namely, either to prevent or remove the ſymptoms that attend large wounds.

To this end, we muſt keep the patient to an exact and ſtrict diet, eſpecially if the ligature be made on the inteſtine; allowing him but juſt ſufficient nouriſhment to moiſten the ſtomach and inteſtines; and what he does take ſhould be liquid, that it may ſoon digeſt and paſs into the blood, before it reaches that part of the inteſtine where the ſuture is made.

The patient ſhould be blooded according as his ſtrength will bear, and the degree of the ſymptoms ſhall direct; and emollient clyſters ſhould be given, if neceſſary, except the *colon* was wounded, and the ſuture is made in that.

To conclude, emollient fomentations and embrocations of the belly ought not to be omitted; the intent of all being to prevent, or allay the in-

flammation, which, as I hinted before, might occasion a thousand other disorders.

Of Herniæ in general.

Every tumor formed by any of the soft parts out of their natural situation, is called an *hernia*; but, at present, I shall only treat of those in the *abdomen*.

Herniæ may be formed in several parts of the belly, and these assume different names according to the places where they are situated. Thus those in the groin are termed *herniæ inguinales*; those in the bend of the thigh *herniæ crurales*; those at the navel, and along the *linea alba*, are called *exomphalæ*; and in any other part of the belly, *herniæ ventrales*.

Of the Hernia Inguinalis.

The *Hernia inguinalis* is so called, because it appears in both sexes at the groin.

In these *herniæ* the parts displaced pass out of the belly through the ring, that is, the arch formed by the *aponeurosis* of the *musculus obliquus externus* in the groin, for the passage of the spermatic vessels in men, and the round ligament in women.

Differences. The parts displaced that form the *hernia*, the part into which they fall, the manner of the *hernia's* being produced, and the time it has continued, occasion great differences in this disorder.

There

There are three different parts that may produce a *hernia* in the groin, *viz.* one or more of the inteſtines, the *epiploon*, and the bladder. That which is formed by one or more of the inteſtines, the ancients have termed *enterocele.* The inteſtine which moſt frequently produces the *hernia*, is the *ilium*, becauſe, being placed in the iliac region, it is nearer the groin than the reſt; but notwithſtanding the ſituation of the other inteſtines, which ſeems not to allow of their coming near the groin; we often find the *jejunum*, and frequently alſo a portion of the *colon* and *cæcum* included in the *hernia.* It may be aſked perhaps, how theſe parts, which are in ſome meaſure fixed by the *meſentery*, or by the *meſocolon*, can be found in the *hernia inguinalis?* The anſwer to this is eaſy: the *meſentery* and *meſocolon* are membranous ſubſtances, capable of extenſion; it is no wonder therefore, that by little and little they are ſo far ſtretched by the weight of the inteſtines, that they cannot any longer ſuſtain them. The *hernia* made by the *epiploon*, is termed *epiplocele*; as that cauſed by the *epiploon* and one of the inteſtines together, is called *entero-epiplocele.* The *hernia* of the bladder may be named *cyſtiocele.* This latter caſe is uncommon, and has ſeldom been known to happen, but in conjunction with ſome of the *viſcera* beforementioned.

When the parts, having paſſed through the abdominal rings, deſcend no lower than the groin, it is called an incomplete *hernia*; when they fall into the *ſcrotum* in men, or into the *labia pudendi* in women, it is then termed complete.

The authors who have treated of *herniæ*, have aſcribed them either to a dilatation, or a rupture.

Finding ſome were produced gradually, without pain, or preceding violence, they have looked upon ſuch as proceeding from dilatation, that is, by a relaxation of the parts. Thoſe which happened ſuddenly from a violent ſtrain, they looked upon as ariſing from a rupture, believing there was then ſome laceration both in the parts that ſupport the inteſtines, and in the *peritonæum* which cloſes the ring. It appears, however, by an exact examination into theſe diſeaſes, that there is no laceration, but always a greater or leſs extenſion; that is, the parts only ſtretch and give way; namely, the *meſentery*, the *moſocolon*, the *peritonæum*, and the *aponeuroſis* of the *muſculus obliquus externus*, whoſe ring being forcibly diſtended, leaves a paſſage for thoſe *viſcera*, that preſent themſelves, to come out. This I ſhall explain more at large in my account of the different cauſes of *herniæ*; and for the future ſhall omit the uſe of the term *rupture*, as being improper.

To conclude, there are ſome *herniæ*, which are recent, and others of long ſtanding. Of the latter, ſome have never been reduced, others being reduced have been kept up by a truſs for a conſiderable time, and have fallen down afterwards; in others again, the parts have frequently deſcended into the hernial ſac, and have as often been reduced, and for ſome time kept up. We ſhall hereafter ſee, that all theſe differences are material, both with regard to the ſymptoms attending each of them, and the manner of treating them.

Causes. An *hernia* may ariſe from an external cauſe, having been often known to proceed from a kick in the groin: by which accident, the

the *aponeurosis* that forms the ring being deprived of its power of contraction, some of the abdominal contents, either from their weight, or some subsequent strain, have passed out of the cavity through this ring. But the most common cause of *herniæ* is internal, as from the quality of the nutritive juices, from the size and weight of the *viscera*, and from the muscles of the abdomen acting jointly with the diaphragm to lessen this cavity, as happens in every effort we make.

Experience teaches us, that the quality of the fluids may dispose the parts to an *hernia*, since it is observable, persons, who use much butter or oil in their food, are almost all subject to this distemper, which is the reason of its being so common amongst those who live in convents. Undoubtedly their nutritive lymph, being too much impregnated with oily particles, does not furnish the solids with sufficient strength; whence it follows, that the *peritonæum*, becoming too lax in such persons, easily distends. Thus the *mesentery* and *mesocolon* yield to the weight of the intestines, and the arch of the *colon* to the weight of the *epiploon*. The ring likewise, having little elasticity, readily gives way to the impulse of these parts which press upon it. Very fat people are almost in the same case; the bulk and weight of the *epiploon*, which is sometimes four fingers breadth in thickness, occasions it to press upon the rings, and dilates them so as to work itself a passage. Old people, upon their recovering from sickness, are also very subject to *herniæ*, from the loose texture of their fibres at that time. These are all the sorts of this distemper ascribed by authors to dilatation.

It happens at other times, that without the part being disposed to a relaxation, the forcible

and ſudden action of the *diaphragm*, and the muſcles of the *abdomen* will occaſion an *hernia*. When all theſe muſcles act conjointly, as in ſtraining, they diminiſh the cavity of the belly in proportion as they contract themſelves, and the parts contained therein are compreſſed; it is no wonder therefore, that the *viſcera*, under ſuch circumſtances, force themſelves a paſſage where they find the leaſt reſiſtance. It is this ſort of *hernia* which authors pretend is made by rupture, though in reality there is no ſuch thing.

The diſpoſition of the *diaphragm*, and of the different coverings of the abdomen, is what inclines the *hernia* to be formed rather in one place than another; but as I ſhall only treat at preſent of the *hernia inguinalis*, let us ſee why it happens there.

In the groin, the *viſcera* meet with no other reſiſtance than from the expanſion of the *peritonæum*, which forms a ſort of curtain before the ring. The *peritonæum*, which is but weak, gives way to the impulſe and weight of the inteſtines before-mentioned; it yields, ſtretches, and is forced even into the *tunica vaginalis*, where it forms a kind of pouch, or bag. This membranous bag is what they call the *ſacculus hernialis*, which ſtretches more or leſs, according to the bulk of the parts that fill it, and forms a perfect or imperfect *hernia*.

The manner in which the *hernia* was formed, with the care that has been taken of it, and the time of its continuance, produce great alterations in the ring, the *ſacculus hernialis*, and even in the parts that form the *hernia*; and theſe alterations are very neceſſary to be known.

In

In an *hernia* formed gradually, that is, by relaxation, if it is of long ſtanding, and no care has been taken to keep it reduced, the ring and entrance of the *ſacculus hernialis* are greatly dilated; the *ſacculus* itſelf is grown thick, ſometimes one third of an inch in thickneſs, and the parts affected by the *hernia* are more and more extended. Thus the *meſentery* and *meſocolon* have been elongated, and their extenſion become ſo habitual, that they could not eaſily contract again. The arch of the *colon* has often changed its natural ſituation, being drawn downwards by the weight of the *epiploon*. In this caſe, we frequently ſee the parts that are contained in the *ſacculus hernialis* become ſtrongly adherent, either one to another, or to the internal ſurface of the hernial ſac.

If care has been taken to keep the *hernia* always reduced, the entrance, or mouth, of the *ſacculus hernialis*, and the ring, have again contracted themſelves in ſome meaſure, and recovered their tone; but nevertheleſs they are continually ready to give way to the weight of the *viſcera*, which will preſs upon them on the leaſt ſtrain. In this caſe, the *ſacculus hernialis* is very little thickened, neither are the *meſentery* and the *meſocolon* elongated, as in the former inſtance.

To conclude, if the *hernia* has been ſometimes kept up by bandage, at other times been ſubject to the preſſure of the *viſcera*, the ring and *ſacculus hernialis* are greatly dilated, the *ſacculus* become very thick, and the *meſentery*, as well as the *meſocolon*, very much elongated, ſo that the inteſtines and the *epiploon* always bear upon the ring, and are ready to force their way through, on the leaſt impulſe, notwithſtanding the bandage; nay, even

without any force, if the bandage happens to be any way out of its place.

In an *hernia* formed fuddenly and by a forcible extenfion, if it has not been attended with any confiderable fymptoms, which is a very uncommon cafe, and if, after its being reduced, care has not been taken to keep it fo, the fame circumftances will occur as in the *hernia* formed by dilatation; for the ring lofes its contraction more and more, and gradually dilates, as well as the mouth of the *facculus hernialis*. The *facculus* likewife grows thicker in time; and all the inteftines and the *epiploon* may gradually fall into it, by the extenfion of their ligaments. But if, on the contrary, it has always been kept reduced by a bandage, the ring will contract, the mouth of the *facculus* becomes lefs without clofing entirely, and recovers its tone. The *facculus* itfelf remains fmall, and but a little thickened, and the *mefentery*, as well as the *mefocolon*, which had only given way to the extenfion of the parts whilft they continued in the fac, recover their fpring upon the reduction being made.

To conclude, if this *hernia* is recent, and attended with a ftrangulation, the ring, which is only weakened in its fpring, will ftill retain a confiderable elafticity; but the mouth of the *facculus hernialis*, which is always thin, becomes relaxed; and if the ftrangulation has continued fome days, it may have occafioned an inflammation, with adhefions, though but flight; that is, the circumvolutions of the inteftines are become adherent either one to another, to the *epiploon*, or to the *facculus hernialis*, within the circumference of the ring, and in the belly round about the ring. The *epiploon* may have become adherent to the parts which

it

it comes in contact with, as well as the inteftine: a gangrene may be the confequence of the inflammation, and may be more or lefs advanced: all which circumftances fhould be duly attended to, when we are to confider of the proper method of treating thefe diforders.

SIGNS. Two circumftances enable us to difcover *herniæ*, and to diftinguifh them from humoural tumors; *viz.* the touch, and the fymptoms which attend them.

HUMOURAL tumors are perfectly hard when they are not difpofed to fuppurate; and when they are, have an œdematous foft feel, or elfe a manifeft fluctuation in them. But the *herniæ* are never perfectly hard, and the foftnefs they have is neither equal in every part, nor does it refemble thofe tumors, where there is an extravafation of fome of the fluids. For though there may be a fluid in fome *herniæ*, the fluctuation is only to be felt in one fingle place, and the reft of the tumor is unequal; whereas the fluctuation in an humoural fwelling may be felt throughout great part of it, efpecially in the middle. Befides, a humoural tumor is not formed on a fudden, like an *hernia*.

IT is not fufficient however for a furgeon to barely diftinguifh an *hernia* from an humoural tumor, by the feel; but he muft endeavour likewife to difcover the different fpecies of *herniæ*; that is, to find out by the touch, what part is inclofed in the *hernia*.

WHEN it is an *epiplocele*, there is nothing to be felt but a doughy foftnefs, which neither abfolutely gives way to, nor very fenfibly refifts, the touch.

If it is an *enterocele*, the ſwelling is more elevated, tenſe, and unequal, and yields and anſwers to the touch: if it is an *entero-epiplocele*, the ſymptoms are mixed.

The circumſtances accompanying the *hernia*, diſcover to us ſtill better what parts are prolapſed.

The *epiplocele*, if formed gradually by relaxation, is neither attended with ſtrangulation, nor any other ſymptom; but if it happens on a ſudden, and the *epiploon* cannot return again, the tumor may become painful: in which caſe, as the *epiploon* is connected to the inferior part of the ſtomach, the patient will feel a kind of dragging or twitching there, and, in conſequence thereof, ſome ſlight reachings to vomit. The excrements will have a free paſſage, notwithſtanding the connexion of the *epiploon* to the arch of the *colon*, becauſe that, at moſt, can only draw it a little towards the lower part of the *abdomen*, and this does not at all impede the periſtaltic motion which is natural to it.

The *enterocele*, proceeding from relaxation, is in general free from ſymptoms, as well as the *epiplocele*; for as the dilatation of the ring of the *obliquus externus* leaves the inteſtine a free paſſage for its periſtaltic motion, the courſe of nature is not interrupted nor diſturbed. Yet it ſometimes happens, that this *hernia* is attended with the ſame effects, as that which proceeds from a violent ſtrain: and this may ariſe from two cauſes; the firſt and moſt frequent is, the bulk of ſome indurated excrements filling that part of the inteſtine which forms the *hernia*, If it be the *colon*, this ariſes from ſome fæculent matter, which by its lodging there becomes very hard. If it is the *ilium*,

ilium, it proceeds from ſomething more liquid, ſince it ſtill contains a portion of chyle; but what is moſt fluid paſſing through the lacteal veins, the excrementitious matter, remaining in that part of the inteſtine which is in the *ſacculus*, acquires a thicker conſiſtence, and forms an obſtruction there, which interrupts the free paſſage between the beginning and end of the inteſtine. The ſecond cauſe of the ſymptoms attending this *hernia* is more uncommon: and this is, an accidental inflammation in the ring, which, leſſening its diameter, ſtrangulates more or leſs that portion of the inteſtine which has paſſed. In either of theſe caſes, the matter that ought to go through that channel is ſuſpended; and this interruption in the courſe of nature (which requires the way to be always free from the entrance of the *pharynx* to the *anus*) produces ſymptoms, which, though at firſt but ſlight, increaſe gradually, and at laſt kill the patient, if they are not removed.

THE *enterocele* produced ſuddenly from a violent and haſty ſtrain, is equally ſubject to theſe ſymptoms; but then they increaſe much quicker, and ſucceed one another very faſt, becauſe the ring, in that caſe, retains ſome of its elaſticity. This elaſticity always inclines the ring to contract itſelf, whilſt the inteſtine is continually dilated by the fermentation of the excrements, and the preſſure of thoſe which are conſtantly forced into it.

AN inflammation, which is the natural conſequence of the mutual preſſure of theſe parts on each other, and of the diſtenſion of the ſeveral blood-veſſels, ſoon comes on, and increaſes the ſtrangulation. The irritation in conſequence of this inflammation eaſily propagates itſelf along

the inteſtinal canal, and affecting the ſtomach, excites an inclination to vomit more or leſs frequent.

Soon after, the pain which the patient feels in the groin, extends all over the belly, and vomitings enſue. At firſt nothing comes up except bilious matter. But the inflammation ſeizing upon the whole inteſtinal canal, nature, who, by the periſtaltic motion of the inteſtines, forwarded the remaining contents, being willing to rid herſelf of that liquid which cannot follow its uſual courſe, forces it, by an antiperiſtaltic motion, to re-aſcend into the ſtomach, and to iſſue thence by vomit. The fœtid ſmell of this diſcharge makes it imagined that the patient brings up his excrement; but it is proper to obſerve here, that what the ſtomach ejects in this caſe, is not the excrement, as ſome authors affirm, ſince that only ought to be called ſo which remains behind, entirely ſeparated from the chyle, when the digeſtion is performed, and is lodged in the *colon*. We may add farther, that when part of the *colon* is included in the *hernia*, the excrement which is lodged in that inteſtine, above the part ſtrangulated, cannot paſs back into the *ilium*, becauſe of the valve of the *cæcum*. For this reaſon, in ſpeaking of the vomiting occaſioned by the ſtrangulation, I mentioned nothing of the excrement, except what is found in the inteſtinal canal. Another ſymptom which follows ſoon after, is the ſuppreſſion of the *fæces* by the *anus*. It is true, indeed, the matter that fills the *colon* beneath the part ſtrangulated, has a free paſſage; but it cannot be excluded at the *anus* without ſome ſtraining, which in this caſe the pain will not admit. As the whole nervous ſyſtem ſuffers, the pulſe be-

comes

comes low and contracted, and the extremities cold; an ardent thirst ensues, and the tension of the belly still increases. After these symptoms come on, if no remedy is applied, a gangrene succeeds, which puts an end to all, with the life of the patient, in a short time.

The swelling, which before was elevated, red, and painful, now sinks, turns livid, and is hardly sensible. The tension of the ring being lost, it no longer strangulates the intestine as before, nor opposes its reduction, so that sometimes it returns into the *abdomen* spontaneously. The pain and tension of the belly abate, from the inflammation being turned into a gangrene; to conclude, the vomiting ceases, but is succeeded by a hickup. The coming-on of this last symptom does not strike the by-standers so much as the disappearance of the other symptoms; and I have known persons upon such occasions, who were not well versed in the nature of this disease, triumph as if they had got the better of it; but their joy was of short duration, the patient soon dying by the gangrene spreading over all the cavity.

Prognostic. In order to direct our prognostic in these cases, the following circumstances are to be taken into consideration; *viz.* the patient's age, the part that forms the *hernia*, the symptoms attending it, and the time of its duration.

In the management of a *hernia* where there is no strangulation, we find by experience that the age of the patient is a circumstance of moment. We may promise a cure in children, and youth, provided care is taken for a considerable time to keep the reduced parts constantly up by a bandage. At this age the dilated ring contracts it-

self

ſelf again, and recovers its tone as the patient grows. But we dare not flatter ourſelves with hopes of the ſame ſucceſs in thoſe who are of a more advanced age; the ring will not then contract itſelf in the ſame manner, and after having reduced the parts, it is very difficult to confine them by bandage, ſince they are always ready to fall down again, either from their own weight, or upon the leaſt ſtrain.

In a *hernia* complicated with a ſtrangulation, the ſtronger the patient is, the leſs can we expect to make the reduction by the operation of the *taxis*; for under that circumſtance the ring has more tenſion, there is greater reaſon to apprehend an inflammation, and more difficulty in removing it if it ſupervenes. We may hope, therefore, ſooner to ſucceed with old people, than with young.

The *hernia epiplocele* without a ſtrangulation, that is, when it has come on gradually, and is eaſy to be reduced, is not liable to any accident; and therefore ought not to be looked upon as a dangerous diſorder. But if care is not taken to keep the *epiploon* reduced, it is almoſt certain, that in time it will contract adheſions in the *ſacculus hernialis*; and as its lodgment there will keep the ring and the mouth of the *ſacculus* conſtantly dilated, the *hernia* may, by admitting the inteſtine, be changed to an *entero-epiplocele*.

The *epiplocele* which is formed ſuddenly, is not always eaſy to be reduced, if the reduction is at firſt neglected. For the *epiploon* being a collection of membranous cells, more or leſs full, the fat in thoſe which are ſtrangulated by the ring, ſlips away above and below, into the neighbouring cells; and the part that remains in the *ſacculus hernialis*, becoming thereby larger than that

which

which is contained in the ring itſelf, cannot poſſibly repaſs. Suppoſing the reduction impracticable, on account of the contraction of the ring, that portion of the *epiploon* which is in the *ſacculus* may inflame, putrify, and come to matter.

It is eaſy to conceive, from a knowledge of the inteſtinal canal, and its uſe, that the *enterocele* may be liable to ſymptoms, to which the *epiplocele*, of what kind ſoever, cannot be ſubject; and conſequently we may affirm, that every perſon who has an *enterocele* is always in danger, if care is not taken to prevent the deſcent of the parts by a proper bandage; nevertheleſs there are ſome *enteroceles* attended with ſymptoms, which we may hope to reduce by the *taxis* and the aſſiſtance of proper remedies, though there are other caſes of which we can form no ſuch hopes.

Those which we may expect to reduce, are the large complete *herniæ*, where, the ring being very much dilated, a great deal of the inteſtine is fallen down; and theſe are attended with ſymptoms, on account only of the quantity of *fæces*, which fill and choak up that part of the inteſtine which forms the *hernia*. Thoſe where a reduction is not to be expected, are the ſmall imperfect *herniæ*, which contain only a little part of the inteſtine.

There can be no hopes of ſucceeding in this latter caſe, for the following reaſons, firſt, becauſe the ring retains all its elaſticity; ſecondly, becauſe it is impoſſible to handle the parts in order to their reduction; and therefore the patient in all probability muſt die, unleſs the operation by inciſion be ſpeedily performed.

In the *entero-epiplocele*, the violent ſymptoms before-mentioned will not happen ſo immediately as in the *enterocele*, the *epiploon* by its ſoftneſs ſecuring the inteſtine from the hardneſs of the ring, and defending it from any injury it might meet with in the different attempts, ſometimes unſkilfully made, to reduce it.

For this reaſon we may be leſs ſolicitous about performing the operation by inciſion. I have done it at the end of ſeven or eight days, and have found the inteſtine quite ſound, though the *epiploon* was gangrened. See my *Obſervations*, p. 215. But I have tried it at the expiration of but thirty-ſix hours in *enteroceles*, and have found the inteſtine gangrened, that alone having ſuſtained the whole compreſſion of the ring, and of the attempts made to reduce it.

To conclude, the nature and the violence of the ſymptoms, if they are come to the height, may eaſily enable a ſurgeon to form his prognoſtic, whether it be for his own direction in conducting the cure, or to ſecure the reputation of the profeſſion from reproach, provided the operation ſhould fail of ſucceſs. If the ſymptoms are very violent, there is all the reaſon imaginable to apprehend that, on performing the operation, the inteſtine will be found gangrened, and perhaps open in the *ſacculus hernialis*; nor can the life of the patient be warranted from the performance of the operation, not only on account of the gangrene which has ſeized on the ſtrangulated part of the inteſtine, but alſo from the inflammation, which probably has already reached the whole inteſtinal canal, and which it is very difficult to remove. I have often ſeen this whole canal inflamed, and marked in

ſeveral

ſeveral places with gangrenous ſpots. See my *Obſervations*, p. 134.

I HAVE ſeen others, where part of the *meſentery* being inflamed had acquired twice its natural thickneſs. See my *Obſervations*, p. 196.

IN ſhort, if we find that all the ſymptoms ſuddenly ceaſe, the tumor ſubſides from a mortification being begun, and the inteſtine returning into the *abdomen* ſpontaneouſly, the death of the patient is inevitable.

ANOTHER circumſtance to direct our prognoſtic, is the duration of the *hernia*. We may venture to pronounce, that an old *hernia*, where care has not been taken to keep it reduced, but the prolapſed parts have contracted a habit of coming out and returning in eaſily, will never be cured. However, to make ſome amends for this, the largeneſs of the ring, and of the mouth of the *ſacculus*, free the patient from the fear of any ſtrangulation happening, unleſs the *fæces* ſhould ſtop there and obſtruct the paſſage.

As to the *hernia* which has been of long ſtanding, and where ſufficient care has been taken to keep the parts conſtantly reduced by a good bandage; if, in conſequence of ſome ſtrain, a deſcent ſhould happen, ſuch an *hernia* is generally attended with ſtrangulation; and the reduction is more difficult to be made, as the contraction of the ring is ſtrengthened by that of the entrance of the *ſacculus hernialis*, which, as has been already obſerved, is become very ſtrait, by the habit it has acquired of contracting itſelf. See my *Obſervations*, p. 197.

CURE. The cure of an *hernia* conſiſts in returning the parts into their natural ſituation, the *abdomen*; and in preventing their coming out again.

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In order to anſwer theſe intentions, we generally have recourſe to diet, ſurgery, and pharmacy.

I HAVE hitherto conſidered *herniæ*, either as being eaſily reduced from the largeneſs of the ring, or as not admitting a reduction; the want of which will neceſſarily be productive of many troubleſome ſymptoms. We muſt therefore conſider each in its proper light, in order to determine how they are to be treated.

IN reſpect to ſuch as are eaſily reduced, as they generally proceed from the quality of the fluids, too much impregnated with oily, and deſtitute of thoſe ſpiritous, particles which are requiſite to furniſh the parts with their proper elaſticity, the aſſiſtance of diet and pharmacy can here be of no ſervice. Art can ſupply no remedy capable of changing conſtitutions; nor is there any ſuch thing as reſtoring the elaſticity of the ring, when by its lax texture it has frequently ſuffered the parts to prolapſe. It is true indeed, ſome perſons have been known to undertake the cure of *herniæ* by aſtringents or ſtyptics taken internally; others by the application of reſtringent cataplaſms and plaſters, with a deſign to contract the dilated ring and reſtore its tone; but the unſucceſsfulneſs of theſe remedies, which, if they had anſwered the purpoſe, would be now in credit and known to every body, is a proof of their inefficacy. Others again have propoſed making an eſchar with a cauſtic upon the mouth of the hernial ſac, in order that the cicatrix might ſupply the uſe of the ring and ſtrengthen the paſſage; but if this cauſtic penetrates no farther than to the *ſacculus*, without cauterizing it, the ſtricture of the cicatrix would be but an indifferent expedient to compreſs the mouth of the *ſacculus*, inſtead of the bolſter of a truſs; eſpecially

ally as this cicatrix will in time grow ſoft; and if the cauſtic penetrates to the entrance of the *ſacculus*, and deſtroys that, the ſeminal veſſels which adhere to it will conſequently be deſtroyed at the ſame time, and the patient be thereby deprived of the uſe of one teſticle.

THE only remaining remedy then is that which ſurgery affords, and this is to be affected, firſt, by reducing the prolapſed parts; ſecondly, by applying a well-made truſs, the bolſter of which preſſing conſtantly upon the ring, ſtops up the paſſage, and ſupports the inteſtines, or the *epiploon*, which are always ready to fall down again into the *ſacculus hernialis*.

SOMETIMES the reduction is eaſy to be made, at others not; and the occaſion of this difference ariſes from the various ſpecies of *herniæ*.

I HAVE ſeen inſtances where the ring and mouth of the *ſacculus hernialis* were ſo much dilated, that the parts paſſed out, or re-entered of themſelves, according to the poſture of the patient. The difficulty then does not conſiſt in reducing theſe *herniæ*, but in keeping them reduced without fatiguing the patient by the uſe of a truſs, which, though well made, is almoſt inſupportable, as it muſt remain on very firm and tight. I have ſometimes known theſe patients, upon being attacked with an habitual cough, have been obliged to leave off the uſe of the truſs, and content themſelves with a ſuſpenſory.

THERE are others, where the ring and mouth of the *ſacculus* are very much dilated, and yet the parts cannot be reduced; either becauſe they have contracted adheſions in the ſac, or becauſe the greateſt part of the inteſtinal canal and the *epi-*

ploon remain there, inſtead of the belly, and nature performs its functions equally as before.

In the firſt caſe, where there is an adheſion of the parts to the *ſacculus*, there is no reduction to be made; they muſt continue as they are. In the ſecond it may be aſked, whether it is poſſible to reduce almoſt the whole inteſtinal canal after it has been long lodged in the ſac, and whether, ſuppoſing it poſſible, it would be prudent to attempt it.

As to the poſſibility, every one is not agreed, on account of the diſproportion between the diameter of the ring, however large it be, and the bulk of the parts, which form a ſort of lump in the ſac. It is added, that, ſuppoſing the reduction eaſy, it is impoſſible to prevent the parts from ſlipping down again, becauſe the *meſentery* and the *meſocolon*, having ſuffered ſo long an extention, are incapable of ſupporting the inteſtines and the *epiploon*, which on account of their weight cannot be kept up by the bolſter of the truſs. Neither is it agreed, that it is right to reduce the parts and to keep them ſo, allowing it to be practicable; ſince, after being reduced, they would be too much compreſſed in the belly by the ſkin, the muſcles, and the *peritonæum*, which muſt have contracted themſelves in proportion to the ſmall bulk of thoſe viſcera they had to contain: and this preſſure, it is thought, joined to the change in the ſituation of the parts, would occaſion an obſtruction of their veſſels, and conſequently an inflammation.

In this caſe, therefore, experience ought to determine, and to be admitted as preferable to the moſt plauſible arguments. I have ſeen the late Monſ. *Arnaud* reduce ſeveral of theſe *herniæ*, of

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long ſtanding, and keep them ſo; and I have known the patients live many years afterwards in good health, and free from thoſe accidents that might have been apprehended. The reaſon of this ſucceſs was, that the precautions he took to facilitate the reduction, conduced alſo to the preſerving them from thoſe accidents that might have happened after the reduction was made. Theſe precautions conſiſt in confining the patient for a fortnight, or three weeks, to his bed; during which time, he is to live entirely upon ſoup and broths, and even of thoſe in ſuch a quantity as only to prevent inanition. It would be proper, likewiſe, he ſhould be blooded three or four times, according to the fulneſs of his conſtitution, and to have his body kept open by gentle purgatives: by theſe means his ſtrength being diminiſhed, the parts become more pliable; and the whole body being emaciated, the ſize of the *meſentery* and the *epiploon* is likewiſe leſſened, whoſe bulk was the principal obſtacle to the reduction. It is then more eaſy to replace the parts in their natural ſituation; which being once done, there is no great difficulty to keep them there. To this end a truſs muſt be applied, and the patient confined to his bed a leaſt a fortnight longer, that the *meſentery* and *meſocolon*, which had ſuffered an extenſion, may contract themſelves as much as poſſible, and recover their former ſtrength; which they will do in that time.

There are ſtill ſome other *herniæ*, the reduction of which is very difficult, though the ring and the mouth of the *ſacculus hernialis* are not much contracted; and theſe are ſuch as I before obſerved, where the *fæces* are grown hard in that part of the inteſtine which lies in the *ſacculus*, and obſtructs the

paſſage of the other excrements, that ought to have a free courſe through the canal. This alſo ſometimes happens in thoſe *herniæ* where care has been taken to keep them generally reduced, but which have ſometimes been ſuffered to come down; for in this caſe, the ring and the mouth of the *ſacculus hernialis* are contracted only to a certain degree.

To conclude, there are other *herniæ*, where the reduction is ſtill more difficult; for inſtance, when the ring and the mouth of the *ſacculus*, being greatly contracted and inflamed, ſtrangulate the parts that form the *hernia*, ſo as to bring on a gangrene, if not ſpeedily reduced.

WHETHER this reduction be more or leſs difficult to be performed, it may be undertaken by two operations; the one called *taxis*, and the other *bubonocele*; the laſt of which bears the name of the diſorder for which it is practiſed.

Of the operation of the Taxis.

THE taxis is an operation, by which thoſe parts which have quitted their natural ſituation are replaced by the hand, without the aſſiſtance of inſtruments.

IN order to execute this properly in the caſe of an *hernia*, I direct the patient to lie upon his back, with his buttocks, and legs raiſed as high as poſſible, and the breaſt a little elevated, that the muſcles of the *abdomen* may not be upon the ſtretch, and that there may be a deſcent from the ring to the cavity of the belly.

THE patient being thus placed, I caution him not to uſe the leaſt ſtrain, that he may not force the inteſtines towards the *hernia*; and I order a

ſkilful aſſiſtant to hold up the *ſcrotum*. If it is an *enterocele*, I place two or three fingers exactly underneath the ring, and graſp the ſwelling at its neck; then gently preſſing the whole tumor with the other hand, I endeavour to ſoften and ſpread the indurated excrement lying in the inteſtines; for it is oftentimes, as we before obſerved, the hardneſs and form of that matter which are the principal obſtacles to the reduction. Authors propoſe to draw more of the inteſtine out of the *abdomen* into the *ſacculus*, that the excrement being extended in a larger ſpace, may take up leſs room in proportion to the quantity of inteſtine that contains it; but this I know by experience to be impracticable. If we are fortunate enough to be able to move part of the ſoftened excrement into the belly, the inteſtine will not be long before it follows. I have frequently found, after having returned ſome part of the inteſtine, that I could not reduce the reſt till I had made the patient lie on the oppoſite ſide to the *hernia*; and upon ſo doing, the weight of the inteſtines has frequently been ſufficient to draw the remainder into the belly.

The inteſtine being replaced, I next try to reduce the *epiploon*; which, provided it is not of too large a ſize, or has not contracted any adheſions in the *ſacculus*, paſſes in eaſily.

The reduction being made, our next concern is to keep up the parts reduced; and the ſecureſt method of doing this is, by the application of a truſs. This truſs ſhould be made to preſs upon the ring in order to cloſe the paſſage; and care ſhould be taken that it be well finiſhed, and applied ſo that it does not incommode the patient. I look upon this application, however, as a mere

palliative remedy, in perſons arrived to a certain age; though in infants and young people, the conſtant application of a well-made bandage has often been known to produce a perfect cure, by allowing the ring a ſufficient time to contract itſelf. The truſs, I obſerved, muſt be kept on conſtantly; for, ſhould the parts deſcend again into the *ſacculus hernialis*, it would very much retard the progreſs of the cure.

From what I have juſt now advanced, it may be inferred, that the application of a truſs is not proper, till after the reduction of the *hernia*; but there is no general rule without an exception, as in this caſe; for in ſome imperfect *epiplocceles* that were not reducible, a truſs has been frequently made uſe of ſucceſsfully. Upon ſuch occaſions a well-made truſs, whoſe bolſter is hollowed, and adapted to the ſwelling, gently preſſes upon the *epiploon*, and not only prevents it from ſlipping out farther, but by compreſſing the *veſiculæ adipoſæ* hinders the oleaginous particles from entering them, and thereby obliges that part of the *epiploon* to collapſe. But this method will be of no ſervice in any *hernia* where the *epiploon* is fallen into the *ſcrotum*.

I proceed now to ſpeak of thoſe *herniæ*, which are attended with the ſymptoms beforementioned; in which caſes the aſſiſtance both of diet and medicine muſt be jointly employed, to deprive the ring of that elaſtic power which hinders the reduction.

The regimen conſiſts of a proper diet, and neceſſary evacuations. As to the former, the communications between the *pharynx* and the *anus* is not open; and ſo far are the contents of the ſtomach from paſſing through the inteſtines, that all

that

that is the inteſtinal canal re-aſcends, and forces its way out by vomit. As ſoon, therefore, as there is no hope of any aliment paſſing into the blood, we muſt allow the patient only a very ſmall quantity of liquids, juſt ſufficient to moiſten the *œſophagus* and ſtomach; for whatever is given beyond that quantity, would excite or increaſe the reaching, and every ſtrain would certainly tend to aggravate the diſorder.

NOTWITHSTANDING the patient cannot receive any nouriſhment, yet the uſe of bleeding frequently repeated, is not on that account leſs neceſſary; for, by emptying the veſſels of the body in general, we likewiſe empty thoſe that have communication with the part affected, and thereby may not only ſtop the increaſe of the inflammation, but may alſo abate it. As by this means we weaken the whole body, we likewiſe relax the contraction of the *aponeuroſis* that forms the ring; and how often has the reduction been ſucceſsfully made by the *taxis*, during the continuation of a ſwoon from bleeding?

AT the ſame time that we uſe veneſection, we ought to apply proper topics upon the tumor, and eſpecially upon the ring, ſuch as emollient cataplaſms. Theſe, by their unctuouſneſs, ſoften the texture of the parts, and by their warmth quicken the motion of the fluids, which are become ſtagnant there. Of the ſeveral cataplaſms that have been recommended upon this occaſion, that which I have found moſt ſucceſsful, is made with the pulp of emollient herbs, wherein a ſufficient quantity of ointment of marſh-mallows has been diſſolved. Care muſt be taken to renew theſe cataplaſms, that they may not grow hard or dry.

To conclude, we attempt the reduction of their *herniæ*, either by the *taxis* beforementioned, or by the operation of the *bubonocele*. The *taxis* is improper if the swelling be attended with inflammation, at least to any degree: for whilst it is inflamed and painful, we may be sure the strangulation still subsists, and it would be in vain to endeavour at the reduction by this operation, which would only serve to increase the disease. When these symptoms are moderate, we may try, every time the cataplasm is changed, to reduce the parts, taking care however not to injure them by too much handling. I have already directed the proper method of doing this; therefore, I shall now pass on to those *herniæ* which cannot be reduced but by the operation with incision, termed *bubonocele*.

Of the Operation called Bubonocele.

It sometimes happens, that the *hernia epiplocele* cannot be reduced, and the *epiploon*, being strangulated by the ring, inflames, suppurates, and forms a kind of simple abscess, the fluctuation of matter being perceptible under the finger. Upon opening this, we find amongst the *pus* some clots or lumps, which are portions of the *epiploon* separated from the rest by the suppuration.

In *enteroceles*, which cannot be reduced by the *taxis*, a suppuration, or rather a gangrene, is then what is most to be apprehended: upon this account we cannot too soon have recourse to the operation, by opening the *sacculus hernialis* and making an incision in the ring to dilate it, the contraction of that being an obstacle to the reduction.

It

It is very difficult to determine here, what is the proper time for performing this operation; and the difficulty arises from the difference that there is in *herniæ*. If, for instance, there is a descent of an intestine only, there is no time to be lost, in order to prevent a gangrene. I have seen, in an *enterocele*, the intestine gangrened and intirely black, in forty-eight hours after its strangulation; for the ring, being but slightly dilated, preserved its elastic power and pressed directly upon the intestine. This does not happen when the intestine is accompanied with the *epiploon*; the softness of that securing the intestine.

In those *herniæ* where the ring is not either contracted or inflamed, and where the symptoms are produced only by the grossness of the excrements, the operation may be delayed; because the symptoms are moderate, and most commonly the intestine is successfully reduced in a few days. I have reduced several at the end of seven or eight; but the judgment of the surgeon is to direct him in this respect, according to the circumstances of the case. That is, he is to consider the patient's age, the nature of the tumor, the manner in which it was formed, its size, and the degree of the symptoms; that he may be able to judge whether by delaying the operation there may be any danger of a gangrene. It is true, I have known patients cured who have had the intestine gangrened; but these cures will not justify us in exposing a patient to such hazard: they are at most but a proof that an intestine may gangrene, and the patient escape; yet it is nevertheless an accident that ought to be avoided. Add to this, that since none but the teguments are cut, the operation is not at all dangerous

dangerous of itſelf; and it is certainly better to do it rather too ſoon, than to neglect it till it is ſome hours too late.

The diet, to which the patient has been confined from the beginning of the ſymptoms, and the blood he has loſt to abate the inflammation, will ſerve as a proper preparation; therefore, all trials to reduce it having proved unſucceſsful, our only buſineſs is to proceed to the operation.

The inſtruments and dreſſings being got ready, the parts muſt be ſhaved, and the patient placed upon his back in the ſame manner as in making the reduction by the *taxis*.

If, by the great tenſion of the ſkin, it cannot be taken up with the fingers, I make a longitudinal inciſion in the middle of the tumor, with a ſtraight biſtory, into the *membrana adipoſa*: if it can be taken up, I do it with the help of an aſſiſtant, and with a ſtraight *biſtory* divide all that is pinched up between the fingers, directing the inciſion ſo, that it reaches from the ring to the *ſcrotum*. Then guiding the *biſtory* by a director, I enlarge the inciſion as far as an inch above the ring, and as much below the ſwelling. When the *hernia* is complete, this inciſion extends to the extremity of the *ſcrotum*. I afterwards divide all the membranous parts as far as to the *ſacculus hernialis*, either by tearing them, or cutting them with a *biſtory*, conducted along the director. It ſometimes happens that a conſiderable large vein is ſituated under the ſkin, which we cannot avoid cutting as it lies juſt before the *hernia*; but firſt, it would be proper to make a couple of ligatures upon it, that the diſcharge of blood may not prevent our proceeding ſafely in the operation.

When the *hernia* is recent, we cannot go on too cautiouſly till we diſcover the *ſacculus hernialis*; for as this is very thin, we might happen accidentally to open it, and at the ſame time wound the inteſtine: but in an old *hernia*, the *ſacculus* is very thick, and there is the leſs danger of being miſtaken. In the firſt caſe, when the *hernia* is recent, the *ſacculus* forms a kind of long bag, of a very thin texture; and was not the colour of it of a paler caſt, and its ſurface not ſo ſmooth as that of the inteſtine, we might be apt to imagine we had got to the inteſtine. In *herniæ* of long ſtanding, the hardneſs of the *ſacculus* and its paler colour will prevent our being deceived in this particular. The *ſacculus* being diſcovered, I lay hold of it, if poſſible, with my fingers, being very careful not to take up any other part beſides, and with the point of my ſciſſars I make an opening ſufficient to introduce the director. If I cannot get hold of it, as may happen to be the caſe when the *ſacculus* is grown hard and thick, I gradually introduce a director, almoſt ſharp pointed, between the *laminæ* which compoſe it, till it penetrates into its cavity; and dividing the different *laminæ* one after another with the biſtory, I thin it by little and little, and at laſt open it. I am certain of having got through the ſac, if, as it generally happens, there is a ſmall diſcharge of water. After this, with the aſſiſtance of a probe, I open the *ſacculus hernialis* as far as its upper part, and introducing my finger within ſide to the lower part, guide my ſciſſars upon that, and finiſh the inciſion.

I have ſeen inſtances of *entero-epiploceles*, where, after making an inciſion into the *ſacculus hernialis*, I have found that the *epiploon* formed a

ſort

ſort of bag that incloſed the inteſtine, which bag muſt be opened, in order to get at the inteſtine. We may diſtinguiſh it by the ſmoothneſs of its ſurface, by its colour and a ſmall quantity of *mucus* that covers it; likewiſe when it has received any hurt, there exhales from it ſometimes a ſort of cadaverous ſmell.

If we diſcover with the finger, that the *ſacculus hernialis* is not opened as high as the ring, we muſt finiſh the inciſion by the direction of the finger, before we think of dilating the ring; nor ſhould we dilate it at all, unleſs there is a neceſſity; and therefore, before we attempt it, we ſhould endeavour to make the reduction. To this end I draw the inteſtine towards me, in order to get a little more of it out of the belly than what was lodged in the *ſacculus*; and preſſing it gently to ſpread its contents, I endeavour to reduce it. If this cannot be effected, the ring muſt be dilated; for which purpoſe I introduce the director through the mouth of the *ſacculus hernialis*, along the inteſtine, into the belly; then preſſing the groove of the director againſt the forepart of the *ſacculus*, I move it a little, to prevent intangling the inteſtine between that and the ſac. This done, I hold the probe in ſuch a manner that the back of my fingers covers the inteſtine, when ſliding a ſtraight biſtory into the groove, I carry that and the director along together, as if they were but one inſtrument. By this means, I make at once an inciſion of about one third of an inch in the mouth of the *ſacculus*, and in the ring; after which, I draw away both the inſtruments together. This inciſion may be performed with much more eaſe and expedition, and without any danger, with the new *hernial*

biſtory,

biſtory, deſcribed and repreſented in the ſecond part of my treatiſe of *Obſervations*. If the old *hernial biſtory* is uſed, we muſt take care, in drawing it away, to raiſe up the handle, that we may avoid hurting the inteſtine, which may happen to come in the way of the edge of the blade. But this precaution is quite unneceſſary in the management of my *biſtory*; as in cutting with that we need only preſs the thumb upon the part which moves the blade out. Some ſurgeons, in making the dilatation of the ring, uſe a very ſharp *biſtory*, whoſe point is guarded with a button, and paſſing it along between the mouth of the *ſacculus* and the inteſtine, ſo that the back is to the latter, they open the ring; and they imagine by this means they cannot wound the inteſtine; but I own, for my part, I cannot believe this, neither would I adviſe any one to follow this method. Others have recourſe to a ſtraight and very blunt-pointed *biſtory*, the edge of which is made like a file, and they uſe it in the ſame manner, being aſſured that, in this way, they ſhall cut the ring without fear of wounding the inteſtine. This indeed is preferable to the other method of making the dilatation, but muſt neceſſarily be very painful, as it is rather a laceration than an inciſion.

Some authors caution us, when we are dilating the ring, to avoid cutting the epigaſtric artery; which is an accident not much to be apprehended, as it lies behind the *hernia*. It is not, however, abſolutely without exception, ſince I have ſeen, though but once only, the ſpermatic chord ſituated anteriorly upon the *hernial ſac*. If in dilating the ring we had opened any conſiderable branch of an artery (for the ſituation of the veſſels, we know, often varies) the inteſtine muſt be firſt re-

duced as will be hereafter directed, then the hæmorrhage muſt be ſtopt, and when that is ſecured, the dreſſings are to be applied. The tent which authors have propoſed to be put into the ring in order to ſtop the blood, is not a ſure method, and it might happen to ſlip into and be loſt in the cavity of the *abdomen*. It is better, therefore, to fix a narrow compreſs, five or ſix inches long, upon the fore-finger, and dipping it in alum-water, lay it upon the opened artery, and hold it there with the finger about half a quarter of an hour; and then withdrawing the finger, leave the compreſs ſecured upon the part by a threaded doſſil. The mouth of the *ſacculus hernialis* and the ring, being dilated or cut open, we introduce the end of the finger, to examine into the dilatation, and enlarge it a little more if neceſſary.

Though the dilatation be made, there may be a difficulty of returning the inteſtine, by its adhering to the *peritonæum* within the cavity at the circumference of the ring. A like adheſion may be found throughout the internal ſurface of the *ſacculus*. If this adheſion has been of long ſtanding, as is ſometimes the caſe in old *herniæ*, where care has not been taken to keep them reduced, it will not ſeparate, nor can it be attempted without running the hazard of injuring the inteſtine; upon ſuch an occaſion, therefore, it will be more prudent to leave the inteſtine unreduced as it is, without endeavouring to deſtroy its adheſions; eſpecially as they are become habitual. It would be neceſſary, however, to dilate the ring a little more, in order that, as it contracts itſelf, which it will do as the wound cicatrizes, there may ſtill remain ſuch a ſufficient opening, that the inteſtine

may

may not ſuffer a compreſſion. But if theſe adheſions are newly formed, ſuch as thoſe which are cauſed by an inflammation, they are eaſily ſeparated with the finger.

SUPPOSING there are no adheſions, or at moſt ſuch as are ſlight and may be eaſily ſeparated by the finger; if the inteſtine is found, it muſt be reduced immediately. The manner of doing this is by puſhing in the inteſtine with the two fore-fingers alternately, putting in that part of it firſt which came out laſt, and taking care not to bruiſe it. It has been ſometimes found very difficult to perform this reduction on fat people, though a ſufficient dilatation had been made, the inteſtine forcing out again as faſt as it was put in; nor could it have been done at laſt ſucceſsfully, without placing the patient in ſuch a poſition as to have his breaſt lie much lower than his belly.

BUT in ſome caſes the inteſtine may happen to be affected, and the diſeaſes of that may make the reduction improper.

IF it is only inflamed, it muſt be ſpeedily reduced, the natural heat and moiſture of the parts being preferable to any topic that can be applied. If by accident it has been opened in performing the operation, but has not contracted by the inflammation any adheſion above the ring, which might fix it there, the looped ſuture muſt be made, as was deſcribed in the article of the *gaſtroraphy*; and though the reduction may be then undertaken, it would be more prudent not to do it till the next day, that it may appear whether the excrements which are in the inteſtines above the part that was ſtrangulated, will diſcharge themſelves in the natural way, or through the wound.

If the inteſtine is found ſo much changed in colour as to threaten an approaching mortification, we muſt not think of reducing it, whether it has contracted any adheſions internally with the ring, or not.

Again, the inteſtine may be really gangrened, and this gangrene may be more or leſs ſpread. If it is only a black ſpot, the reduction ſhould be deferred, for this will fall off in a few days by ſuppuration, and the inteſtine will then be open: upon this account therefore the inteſtine ought to be left out; and if it does not adhere to the inſide of the ring, we muſt paſs a double thread about it, in the ſhape of a loop, to prevent its returning of its own accord into the belly, as it would otherwiſe certainly do. If the gangrene has ſeized on all that portion of the inteſtine which is protruded, we muſt cut off the whole gangrened part; and if afterwards the ſound parts cannot be re-united by a ſuture, but the patient is ſo fortunate to eſcape with his life, the office of the *anus* will be ſupplied by the groin.

I have inſiſted here, that the reduction ought never to be made when the inteſtine is open, gangrened, or in danger of a gangrene; yet I know, as well from my own experience as that of others, that it has been often reduced, though in the condition wherein I forbid it: nor am I ignorant that many patients have diſcharged their *fæces* through the wound for a time, and when the inteſtine has been healed, the wound in the teguments was ſoon cured afterwards; but I am as well convinced on the other hand, that many patients have loſt their lives from the *fæces* being voided into the *abdomen*; and therefore the method

method I propoſe is the ſafeſt in effecting the cure.

It now remains, if the *epiploon* is found with the inteſtine, to take care of that. If there is but a ſmall portion of it, and that adheres, it muſt be left as it is: if there is a larger quantity, and adherent, part muſt be cut off, and the reſt remain without deſtroying the adheſion. The hæmorrhage which may enſue is inconſiderable, and eaſily ſtopped. If there is a ſmall portion of the *epiploon* which is found, and does not adhere, it ought to be reduced: when there is a greater quantity, and that in a ſound ſtate, it may either be reduced, or left in the wound, and in two or three days it will return of itſelf. Probably the *epiploon* in this caſe is not elongated, but only came out becauſe the *colon*, being drawn down by the weight, has deſcended below its natural ſituation. By the horizontal poſture, which the patient muſt be confined to in bed, the *colon* will re-aſcend, and by degrees carry the *epiploon* along with it, which will not then be found too long: why therefore ſhould the ligature be made, and the *epiploon* cut? Nature has not formed it in vain, and by this means we ſhould deſtroy a part that is very uſeful. But if the *epiploon* is gangrened, it is then a dead ſubſtance, which muſt be ſeparated by a ligature. To this end, it ſhould be drawn out a little further, to make the ligature more conveniently in the ſound part, as has been before obſerved in treating of the *gaſtroraphy*.

Having thus taken care of the inteſtine and *epiploon*, the next thing that requires our conſideration, is the *ſacculus hernialis*. If the *hernia* was complete and of long ſtanding, the *ſacculus*, as was ſaid above, is become very thick and hard;

for which reaſon the greateſt part of it ſhould be cut away, only avoiding to wound the ſpermatic chord which adheres to it. In women, if the *hernia* is attended with no diſcharge from the reduced parts, the ligature of the *ſacculus* muſt be made as near as poſſible to the ring: by this means the ring will be found cloſed, when the ligature falls off, which will prevent a return of the *hernia*. But, in men, this cannot be done, without tying up at the ſame time the ſeminal veſſels, which are cloſely united to the ſac: we muſt content ourſelves therefore with cutting off as much as we can without wounding thoſe veſſels.

THE dreſſings are to be different, according to the method that has been uſed in the operation.

IF we have reduced the inteſtine and the *epiploon* together, or if, upon finding the *epiploon* adherent to the *ſacculus*, we have reduced the inteſtine only, we muſt place upon the ring a pellet of lint wrapt up in a rag. This pellet muſt not cloſe it up ſo exactly, as to prevent the paſſage of any ſerous diſcharge, which may ouze out for ſeveral days, eſpecially in ſuch *herniæ* where the *ſacculus* has been found loaded with that kind of fluid. The reſt of the wound muſt be dreſſed with dry lint, proper compreſſes, and the bandage named *Spica* looſely applied, that it may not irritate the wound.

IF it has been judged proper to leave the inteſtine out, either on account of its ſtrong adheſions, or of its being opened or gangrened, we muſt omit the uſe of the pellet, which would injure the inteſtine by preſſing upon it, and apply only dry lint covered with compreſſes and a ſlight bandage.

IT

It is not enough, however, that the operation is performed, unleſs we remove the ſymptoms, which having preceded the operation, may ſtill ſubſiſt. It is true there is no longer any ſtrangulation, which at firſt gave occaſion to them; but, in this caſe, the effect does not always ceaſe with the cauſe. Sometimes part of the inteſtine has been inflamed, and the *meſentery*, by the diſtention of its veſſels, grown three or four times thicker than it naturally ought to be. We ſhould endeavour to remove this inflammation by bleedings, more or leſs copious and frequent; by embrocations, and fomentations upon the belly, often renewed; by diet; by clyſters, emollient, reſolutive, or carminative, according as the ſymptoms indicate; and by ſoftening drinks, repeated in a greater or leſs quantity as the vomiting will permit; eſpecially as, by the reduction, the courſe of the inteſtinal canal is now open for the free paſſage of the excrements.

When the inteſtine is reduced, the diſtemper then requires no other care as to regimen than what is generally obſerved in other wounds.

But when an inteſtine is gangrened and remains unreduced, particular care will be neceſſary on account either of the gangrene, chyle, or *fæces*, which, for ſome time, paſs through the wound. In ſuch a caſe, we ſhould allow the patient but very little nouriſhment at a time, that the chyle may be received into the blood, before it arrives at the opening of the inteſtine in the wound: by this means we may prevent excoriations, which the diſcharge from the opened inteſtine might occaſion on the circumference of the wound.

SOMETIMES part of the bladder has been known to paſs through the ring, and form a tumor in the *ſcrotum*, large in proportion to the quantity of urine contained in it: this can only be its *fundus*. The part that occaſions the *hernia*, is not contained in a *ſacculus hernialis*, becauſe the bladder is ſituated in the cellular ſubſtance of the *peritonæum*; though it may be ſo, if the *fundus* of the bladder has drawn with it part of the *ſeptum* that covers it in the *pelvis*. In that caſe the *ſacculus* will be found on one ſide only, and may poſſibly give occaſion to an *enterocele*, or an *epiplocele*. Either of theſe *herniæ* may alſo precede that of the bladder.

THE *herniæ* of the bladder is diſtinguiſhed by the ſoftneſs of the tumor, a frequent inclination to make water, the pain in voiding it, and the diſappearance of the tumor when preſſed upon. It is not of dangerous conſequence, and the method of remedying it is, after having emptied the tumor, to apply a ſoft truſs upon the part.

I SHALL ſay nothing here of the *hernia* that is ſuppoſed to happen through the *foramen ovale*, as it is not a ſettled point whether ſuch a caſe can happen.

Of the crural Hernia.

THERE is no other difference between an inguinal and crural *hernia*, but what ariſes from the places where they are formed. Men are moſt ſubject to the former, and women to the latter; proceeding from the figure of the *pelvis*, which is largeſt in women. In reality, while the *uterus* and the bladder concur by their bulk to force the inteſtines on each ſide, the *oſſa ilia* being more ſpread in them, afford larger ſpaces for the parts

to be received on the ſides, and to recede from the groin.

In the crural *hernia*, the parts generally paſs out of the *abdomen*, under the *ligamentum Faliopii*, in the ſpace formed by the attachments of this ligament to the *os pubis*. It is owing to the fat which envelopes the crural veſſels, that the *viſcera* more eaſily ſlip down under this ligament, and thoſe veſſels are always found behind the *hernia*. The parts extend themſelves afterwards more or leſs under the *aponeuroſis* which proceeds from this ligament, and covers the muſcles that form the forepart of the thigh.

The *peritonæum* in its natural ſtate obſtructs their paſſage here, as it does at the ring, but it likewiſe gives way, as in the inguinal *hernia*, to the preſſure of the *viſcera*; and being diſtended, forms a hernial bag of a greater or leſs ſize, according to the bulk of the prolapſed parts.

I have before obſerved, that in the inguinal *hernia* the *colon* is often found, and the *cæcum* very ſeldom: but in the crural *hernia*, the bag of the *cæcum* is frequently ſeen, with the beginning of the *colon*. As for the reſt, what has been ſaid about the inguinal *hernia* agrees alſo with the crural. The kinds, differences, cauſes, ſigns, and ſymptoms are the ſame, and are to be treated in the ſame manner.

But let us ſee what differences there may be in reſpect to the performing the operation by inciſion in theſe two caſes. In the inguinal *hernia*, after having divided the ſkin, we meet with nothing to cut but a cellular membrane, till we come to the *ſacculus hernialis*. In the crural, we find the *aponeuroſis* abovementioned; whoſe conſiſtence being more firm than that of the cellular membrane,

 might

might occasion it to be mistaken for the sac itself. In the *inguinal hernia* the epigastric artery passes behind the *hernia* immediately above the entrance of the *sacculus*; in the crural, it passes before it; therefore great care must be taken to avoid opening it in making the dilatation: and in order to do this, we must dilate the entrance of the *sacculus hernialis*, and divide the *ligamentum Fallopii*, by making our incision obliquely towards the *linea alba*; and also very small, as the epigastric artery is contiguous.

The dressings are the same as in the inguinal *hernia*.

Of the Exomphalos.

We call that an umbilical *hernia*, which happens along the *linea alba*, from the *cartilago ensiformis* to the *symphysis* of the *os pubis*: for though authors, under this head, have only spoken of the *herniæ* which appear at the navel, it is certain they happen in the same manner, the whole length of the *linea alba*, between the two *musculi recti*; nor is this to be wondered at. In every effort or strain that we make, all the muscles of the abdomen contract at the same time; which cannot be done but the *linea alba*, as it is formed by the union of the *aponeuroses* of these muscles, must be drawn on each side, and consequently greatly stretched. By means of this distension it happens, that in many people, the ring of the navel is opened; in others the *aponeurosis* being much distended becomes thinner in some particular place, and at last gives way to the weight of the *viscera*. Whenever any of these tendinous fibres have lost their spring, they yield more and more to disten-

sion,

ſion, and no longer aſſiſting their neighbouring fibres, theſe loſe their elaſtic power likewiſe, and giving way in the ſame manner, make room for the parts that are fluctuating in the belly; and as ſoon as the inteſtine and the *epiploon* have once begun to form an *hernia*, the ſwelling gradually increaſes. I have always obſerved that the *herniæ* at the navel become of a much larger ſize than thoſe in the *linea alba*; for, in the former, the parts are only covered by the *peritonæum*; which, being ſingle under the ſkin and fat, forms a kind of herniary cyſt: whereas in thoſe along the *linea alba*, they are covered both by the *aponeuroſis* that forms the *linea alba*, and by the *peritonæum* that lines the inſide of it; and as this kind of herniary cyſt is thicker and ſtronger than the other, it makes a greater reſiſtance againſt the impulſe of the parts, and the *hernia* does not increaſe ſo much.

WITHOUT entering into the particulars of the kinds, differences, ſigns, cauſes, ſymptoms, and prognoſtic of theſe *herniæ*, I ſhall here, as I did in the crural, refer to the inguinal *hernia* what relates to them in common, and ſhall only ſpeak of what is peculiar to each.

IT is firſt obſerved, that the umbilical *herniæ* are not ſo frequent either as the inguinal or crural. This, in all probability, is, becauſe in all violent ſtrains, the diaphragm acting jointly with the muſcles of the *abdomen*, thereby forces the inteſtines and *epiploon* downwards.

IT is obſerved likewiſe, that women with child are particularly ſubject to this diſorder; which undoubtedly proceeds from the largeneſs of the *uterus*, which bears up the *viſcera*, and thereby preventing them from falling to the lower

part

part of the *abdomen*, they work themſelves a paſſage at the navel.

THE contents of this *hernia* are generally the *jejunum*, *colon*, and *epiploon*, together, or ſeparately. If it is the *colon* only, the *epiploon* is not found before this inteſtine in the *hernia*; but, if the *jejunum*, it is covered by the *epiploon*, which makes a ſort of curtain or hood before it, wherein it is incloſed.

IT is very ſeldom known, that umbilical *herniæ* are formed on a ſudden, like the inguinal or crural; and we may venture to aſſert that they are always cauſed by dilatation. They are at firſt very ſmall, and increaſe gradually; and if we are called to a patient who has an umbilical *hernia*, attended with ſuch bad ſymptoms as proceed from the ſtrangulation of the inteſtine, we at the ſame time generally find, that the *hernia* has been of ſome ſtanding, and has become troubleſome but lately.

THE ſymptoms to which an umbilical *hernia* is ſubject, being the ſame as in the inguinal *hernia*, I ſhall not enlarge upon them; but ſhall only obſerve, that I have often known women, both in the time of their pregnancy and at other times, complain of ſlight but almoſt continual colics; and upon queſtioning, or examining them, I have found, they had a ſmall umbilical *hernia*, which they had not at all regarded. It is true, the inteſtine was not ſtrangulated in theſe caſes; but being intangled at the mouth of the *ſacculus* by the angle it made, its periſtaltic motion was performed with difficulty, and the diſorder communicating itſelf to the reſt of the inteſtinal canal, occaſioned thoſe colics with which the patients were affected.

It is frequently very hard to reduce the *epiplomphalos* by the *taxis*, tho' there is no strangulation. The reason of this difficulty is, the *epiploon* forms several cells in the hernial sac, each of which contains a fold of the intestine. I have seen these cells marked and distinguished by several adhesions of the *epiploon*, in different parts of the *sacculus*. In this case, the attempts that are made to reduce the intestine prove unsuccessful, from the difficulty there is in distinguishing it from the *epiploon*.

When we perform the operation of the *exomphalos*, we are not certain of finding the intestine covered by the *epiploon*; and if it is, it may adhere to it, and therefore we cannot make the first incision with too much caution.

In the inguinal *hernia*, the incision is made longitudinally; here it must be crucial, as well in the herniary bag as in the skin: in all other respects, the operation is the same as for the inguinal *hernia*.

If there is a great quantity of the *epiploon*, there must be several ligatures made upon it to secure the hæmorrhage, which is sometimes very considerable; and afterwards what is superfluous should be cut off.

To conclude, if the *sacculus hernialis* is very large, we must take off part of the angles formed by the crucial incision.

As to the dressings, they scarce differ at all from those of the *enterocele*.

Of the ventral Hernia.

What is commonly termed a ventral *hernia* is a tumor formed on one and sometimes on both

sides

ſides of the belly, by the *epiploon* and ſome of the inteſtines, which raiſe up the teguments. It is ſoft, elevated, and larger at its baſis than at its ſuperior part. It diſappears when preſſed upon, and returns again when the preſſure is removed. I have ſeen an *hernia* of this kind take up the whole anterior part of the belly, extending itſelf on both ſides.

Causes. The cauſe of this ſort of *hernia* is from the relaxation of the containing parts, both thoſe that are called common, and thoſe that are proper to the *abdomen*. Theſe membranes being ſtretched to a certain degree, may, from different cauſes, loſe the greateſt part of their elaſticity; and this we ſee chiefly in ſuch women as have had a great many children. Some have thoſe ſwellings on each ſide of the belly, which are filled with the inteſtine and *epiploon*, and diſappear when preſſed. They ariſe ſometimes too from a dropſy; and may alſo be occaſioned by the exceſſive bulk of the *epiploon*.

As each of the *muſculi recti* is incloſed in a very ſtrong ſheath, this kind of ventral *hernia* is ſeldom formed where theſe muſcles are ſituated, but generally on the ſides of them.

Prognostic. As theſe *herniæ* are never attended with a ſtrangulation, they are not reckoned dangerous; nevertheleſs, if all the containing parts have loſt their elaſticity, as I once ſaw in a young woman who was very fat, this relaxation will produce ſymptoms from the contained parts being deprived of their ſupport. Thus the inteſtines and the weight of the meſentery ſtrain upon their ligaments at the *vertebræ* of the loins; the liver draws down the diaphragm; and from this exten-

ſion

ſion or ſtraining, which is almoſt general, enſue pain, ſwoonings, and oftentimes diſeaſes: as happened in this young woman, who could neither ſtand nor ſit, but was obliged to lie down, becauſe that poſture, being horizontal, delivered her from thoſe dragging pains occaſioned by the weight of the *viſcera* when not ſupported.

CURE. A pretty tight bandage, or a pair of ſtays of a proper make, are ſufficient to ſtop the progreſs of theſe *herniæ*; and if they are grown conſiderable, as that juſt mentioned, we muſt make the patient wear a bandage like a ſling, which ſupplying the want of ſtrength in the containing parts, may bear up the *viſcera*. This ſort of ſling is ſupported by a girdle round the waiſt; but if the belly is very heavy the patient will not be able to bear this girdle, which, however broad it may be, will cut the waiſt: to remedy this inconvenience, the patient muſt wear, under the ſhift, a ſort of whalebone boddice, ſtrengthened behind with four buſks of the ſame, one end of which muſt bear upon the back, and the other upon the top of the buttocks; the girdle will then preſs upon this without hurting the patient, and will keep up the ſling that ſupports the belly. I have ſeen *herniæ* of this nature cured by theſe applications, continued for a longer or ſhorter time, according to the degree of the diſorder: that which I have been ſpeaking of, was cured in leſs than ſix months; ſo that the ſize of the belly was diminiſhed one half.

THERE may be yet another kind of *ventral hernia* formed in the *abdomen*, which is ſo much the more dangerous as it appears but little externally, and conſequently may happen without being diſcovered;

vered: this does not come on the ſides of the belly, but under one of the *muſculi recti*, and within the ſheath which incloſes it: to render this intelligible, I ſhall explain it by an example.

A MAN has formerly received a wound by a ſword, which went through one of the *muſculi recti*, and penetrated into the cavity of the *abdomen*. This wound has been long healed; but that part of the tendinous ſheath which lies under the muſcle, and the *peritonæum* when they were cicatrizing, adhered to the muſcular ſubſtance; for the lips of a wound in the *peritonæum*, and other tendinous parts, never unite together. In this caſe then, the inteſtine forcing the internal cicatrix, intangles itſelf between the muſcular fibres, after having firſt ſeparated them from each other. The tendinous ſheath ſtrangulates and compreſſes that part of the inteſtine which has paſſed, and that ſtrangulation produces all thoſe ſymptoms which, in treating of the inguinal *hernia*, we have obſerved to be inſeparable from it.

THESE ſymptoms often deceive people, being almoſt of the ſame nature as thoſe that attend the colic called *miſerere*; and for want of due conſideration, or information, they endeavour to cure an imaginary diſorder, inſtead of the real one.

SIGNS. A violent pain in one particular point, and ſymptoms ſimilar to thoſe before-mentioned, as attending the inguinal *hernia*, may diſcover to us the nature of this diſorder, eſpecially ſuppoſing the patient has been formerly wounded in that part of the *abdomen*; and the touch will help to confirm our opinion, notwithſtanding the thickneſs of the *muſculus rectus*, which covers the *hernia*.

PROG-

PROGNOSTIC. The ſymptoms will never ceaſe while the ſtrangulation remains, and as the thickneſs of the *rectus* will neither allow emollient topics to penetrate to the ſtrangulation, nor ſuffer the ſurgeon to attempt the reduction of the inteſtine by the *taxis*, another operation muſt be undertaken, to reduce it without delay.

CURE. The patient being laid upon his back, with the breaſt and knees a little elevated, in order to relax the ſkin and muſcles, I make an inciſion through the ſkin exactly upon the ſwelling: the ſkin and fat being divided, I make a ſlight opening in the *aponeuroſis*, which covers the *rectus*, and introducing a director, I enlarge the inciſion above and below, obſerving not to cut any of the nervous interſections. This done, I proceed with great circumſpection to cut into the body of the muſcle; for the inteſtine lies directly under it, or rather between its fleſhy fibres, and is not incloſed in any herniary cyſt. Proceeding thus gradually in opening the muſcle, I divide it upwards and downwards, obſerving the ſame caution about the nervous interſections as was beforementioned. Having diſcovered the inteſtine, we may frequently reduce it without making any further inciſions; but if this cannot be done, we are to convey a director within the ſtricture, and with the ſame hand covering the inteſtine, we introduce a ſtrait biſtory into the groove of the director, and divide a little of the ſtricture; for a ſlight inciſion in the *aponeuroſis* is ſufficient to remove the ſtrangulation. This might be more eaſily performed by my hernial biſtory, and without danger. The dilatation being made, the inteſtine is to be returned into the *abdomen*.

THIS

This opening in the teguments is not considerable enough to require the *gastroraphy*; but, nevertheless, the wound must be dressed in such a manner, as to prevent the intestine from pushing out again. This may be done by a pellet of lint, wrapt up in a fine rag, and applied upon that part of the belly where the opening is made; taking care to secure it, and to apply a fresh one at every dressing till the wound is cicatrized.

The wound being healed, the patient may be subject to a return of the disorder; but to prevent that, he must constantly wear a pellet or bolster fastened on with a girdle upon the cicatrix, to hinder the parts from pushing out upon any strain.

Notwithstanding the exactness, with which I have endeavoured to particularize the differences to be found in *herniæ*, there may yet be others that may have escaped my notice, and of which daily experience may afford us examples.

Of the DROPSY.

The dropsy is a disease wherein part of the *serum* of the blood, separating, and quitting the course of the circulation, stops in some of the cavities, and there stagnates.

There are two species of this disease: one produced by infiltration or transudation, the other by effusion. In the first, which is called an *anasarca* or *leucophlegmatia*, the *serum* is diffused into, and fills the cells of, the *membrana adiposa*, and oftentimes the whole cellular substance of the body, as well in the great cavities as in the inter-

ſtices of the muſcles. If the tranſudation affects only one or more particular members, it is termed an *œdema* or an œdematous ſwelling. In the ſecond kind of dropſy, the *ſerum* is collected in ſome particular cavity, and the diſeaſe aſſumes different names according to the place where it is ſituated. Thus, when it is lodged in the *abdomen*, it is termed an *aſcites*; in the head, an *hydrocephalus*; in the *thorax*, an *hydrops pectoris*; and when in the *ſcrotum*, an *hydrocele*. An *anaſarca* and a dropſy of ſome particular part may affect a perſon at the ſame time.

As the principal deſign of this treatiſe is to offer ſuch aſſiſtance as ſurgery affords, I ſhall not enter into any farther accounts of diſeaſes than will be neceſſary to inform us, 1ſt, whether they can be cured by chirurgical operations; 2dly, what kind of operations are proper upon the ſeveral occaſions; and 3dly, as to the time and manner of performing them. For this reaſon I ſhall ſay but little about the cauſes of the dropſy; and in treating of the different ſpecies of it, ſhall paſs directly to the diagnoſtic ſigns.

Of the Anaſarca.

SIGNS. The *Anaſarca* is eaſily known, being diſtinguiſhable both by the ſight and touch. The whole body is bloated and conſiderably larger than in a natural ſtate, increaſing ſometimes to ſuch a degree, that the patient is not only unable to make uſe of his limbs himſelf, on account of their weight and ſize, but from the difficulty there is in moving them, he can hardly receive any help from thoſe who attend him. The colour of the ſkin is paler than is natural; and

upon preſſing the finger on any part, the impreſſion for ſome time remains. In the *abdomen* the navel appears ſunk in.

An *œdema* in any part has the ſame appearances as the *anaſarca*.

The Prognostic. In order to form a juſt prognoſtic of this diſeaſe, we muſt conſider the nature of it, and the ſymptoms that attend it: we may in general affirm it to be very dangerous, as it depends upon the vitiated ſtate of the fluids, which it is not always in our power to remedy.

The Cure. I have ſometimes known inſtances where the extravaſated water has returned into the circulation, and been evacuated either by ſweats or urine; but theſe are miracles which rarely happen, and nature has generally occaſion for the aſſiſtance of art; *viz.* ſuch as diet and ſurgery afford. Diet, in this caſe, is moſt effectual; it is that alone can correct the vitiated juices of the ſtomach, which are the ſources of indigeſtions; remove the obſtructions which may happen in different parts; reſtore the courſe of perſpiration and urine; in ſhort, change entirely the texture of the blood, which, by abounding too much in *ſerum*, overflows the parts.

I shall paſs over the particular methods directed for this purpoſe, confining myſelf to ſuch only as are within the province of ſurgery.

If the extravaſated *ſerum* does not return into the circulation, the relaxation it occaſions of the parts where it ſtagnates, deſtroys, in ſome meaſure, their elaſticity, and puts it out of the power of medicine to act. In which caſe we are obliged to have recourſe to a chirurgical operation to diſcharge part of the waters.

This

This operation is performed by making one or more incisions into the teguments, of a greater or less depth, in which we only imitate nature, who frequently produces a number of small vesications upon the inferior parts, as upon the legs, for instance, by which the waters are discharged. It has been a method made use of by others as well as myself to make incisions three or four fingers breadth long, and two deep, either in the inferior and inner part of the thigh on the side of the knee, or in the lower part of the legs upon the ankles; the swelling being there most considerable. By these incisions, more than half the water that was diffused over the whole body, was discharged in the space of four and twenty hours; for all the cells having a communication one with another, those that were opened filled again as soon as they emptied themselves. I have seen above seven gallons of water discharged this way in the time before-mentioned; but I have found by experience, that these large incisions are subject to great inconveniences. The first is, that in two days, the lips of the wound are nearly closed, having hardly any discharge; so that you are obliged to make new incisions. A second and more considerable inconvenience is, that the very great evacuation made in a short time, weakens the patients so much as to endanger their lives. Thirdly, from a defect of heat in the part, it is sometimes liable to a gangrene. Considering these ill consequences, I have laid aside this method; and in order to procure the same advantages without running any hazard, I now make several punctures near a quarter of an inch deep, in the lower and inner part of the legs, with the *scarificator*. Those

 who

who are not provided with this instrument may answer the same purpose by making ten or a dozen small punctures with the point of a lancet, just sufficient to penetrate the skin. We find these punctures procure as great a discharge of the waters as the large incisions, and the evacuation, being made gradually, is not so liable to weaken the patient; besides, as they heal in two days, they are not subject to become gangrenous.

It is true, they must be repeated, but as they are neither attended with pain, nor require any dressing, the patient will hardly oppose their being renewed: and in my opinion, these punctures are the nearest imitation of the natural discharge by the little vesications beforementioned.

Of Dropsies by Effusion.

As the several dropsies produced by effusion, are distinguished by signs peculiar to each species, I shall consider them separately.

Of the Hydrocephalus.

The *hydrocephalus* is an effusion of water in the *cranium*, between that and the brain, and taking rise from the ventricles is attended with an infiltration of *serum* throughout the whole substance of the brain.

Signs. The head is much larger than in the natural state, and more or less so according to the degree of the disease. The bones of the *cranium* which form part of the face, being grown soft, and having changed their figure in proportion to the progress of the distemper, occasions an altera-

tion

tion of the countenance: the eyes appear almoſt out of the head, at leaſt project very much, becauſe the hind part of the orbit, which is become ſoft, is thruſt forewards. The ſoftneſs of the bones of the *cranium* may be diſtinguiſhed under the finger.

PROGNOSTIC. As the aſſiſtance of diet and ſurgery has been found ineffectual in this diſeaſe, it has been hitherto looked upon as incurable.

Of the Dropſy of the Breaſt.

THE breaſt, as well as other parts, is ſubject to a dropſy by effuſion; that is, a certain quantity of water is lodged within its cavity, ſometimes on one ſide only, ſometimes on both.

THIS diſorder, like other dropſies, may ariſe from the ill ſtate of the juices; but it proceeds more frequently from a diſeaſe of the lungs.

SIGNS. The ſigns of water being lodged within the breaſt, are, firſt, a ſhortneſs of breath, more or leſs according to the quantity of water therein contained; for the water, in this caſe, hinders the natural dilatation of the lungs in inſpiration. Secondly, Inſpiration is more eaſily performed than Expiration. Thirdly, If the effuſion is only on one ſide, the patient finds it painful to lie on the other; and that ſide where the effuſion happens, if there is much water, is viſibly larger than the other; ſince, upon each reſpiration, the ribs are neceſſarily deprived of their motion, and are leſs depreſſed in expiration. Fourthly, The face is ſomewhat ſwelled, as alſo the arm and leg on that ſide where the effuſion is lodged. All theſe ſigns are attended with other ſymptoms, proceeding from the original diſorder which occaſioned the effuſion.

Prognostic. The dropſy of the breaſt is one of the moſt unhappy diſeaſes that a perſon can be afflicted with, as it proceeds either from a morbid ſtate of the blood, or from a diſeaſe of the lungs; and yet I have ſometimes ſeen it cured. Nature has reſources which we are unacquainted with; and I have known, though but very ſeldom indeed, that where the lungs have been ſound, the blood has recovered its due conſiſtence, and the extravaſated fluid returning by ſecret paſſages into the circulation, has been afterwards carried off by the common emunctories. We have room to hope therefore, that a proper diet, with the aſſiſtance of nature, may reſtore the fluids to a good ſtate.

The extravaſated water may be diſcharged by a chirurgical operation; *viz.* by making a puncture with a *trocar*, four fingers breadth from the ſpine, between the fourth and fifth of the falſe ribs, counting from below upwards; and in order to perform this properly, the ſame precautions muſt be obſerved as will be mentioned when we treat of the *aſcites*. This operation indeed does not cure theſe patents, but may afford relief to them, as the quantity of water which fills the breaſt, and is conſtantly increaſing, diſtreſſes them very much, and renders their breath every day ſhorter and ſhorter. If the breaſt is freed from this oppreſſion, the lungs will follow the dilatation of the *thorax* in inſpiration, and reſpiration will then be more eaſy, and not ſo ſhort.

Of Dropſies of the Abdomen.

The *abdomen* is ſubject to two kinds of dropſies, proceeding from effuſion, which, being arrived

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to a certain degree, ſeem to the ſight and touch to be of the ſame nature, but are in reality very different. In the one, the water is diffuſed in the cavity of the *abdomen*, ſo that the *viſcera* ſwim, as it were, in it: in the other kind, the extravaſated fluid is contained in a *cyſtis*.

Of the Aſcites.

An *aſcites* is that ſort of dropſy where the water is diffuſed into, and fills, the whole cavity of the *abdomen*.

Signs. In this diſorder the diſtenſion of the belly is in proportion to the quantity of water contained therein, which we may eaſily perceive to fluctuate by laying one hand on one ſide of the belly, and ſtriking lightly with the finger, upon the other. The navel protuberates, whereas in the *anaſarca* it appears ſunk in. The patient is generally very thirſty, his urine high-coloured, very little in quantity, with a lateritious ſediment; and the ſkin dry and hard. When the belly is very full, reſpiration becomes difficult, the diaphragm being deprived of its free action by the reſiſtance of the water in the belly. In this caſe the legs and thighs frequently grow œdematous.

The *aſcites* is almoſt always cauſed by a diſeaſe of the liver, or by a ſchirrous tumor ſituated in ſome part of the belly; and the difficulty of removing obſtructions in the *viſcera* occaſions this diſeaſe to be generally mortal: we can make therefore but a very bad prognoſtic, though ſometimes I have ſeen it cured.

Cure. There are two curative intentions to be anſwered in this caſe. The firſt is, to dry up the ſource of the extravaſating fluids; the ſecond,

to diſcharge thoſe which are already extravaſated. For the firſt intention we muſt have recourſe to diet and medicine; as theſe only, in concurrence with nature, can correct the ill ſtate of the juices, and reſtore the ſound and natural ſtate of the *viſcera*, whoſe obſtruction is oftentimes the primary cauſe of the fluids being vitiated. It has ſometimes happened that by this means the ſecond intention has been anſwered at the ſame time, that is, the extravaſated water returning into the veſſels has paſſed off by urine; but inſtances of this kind are very uncommon, and we are generally obliged to have recourſe to the chirurgical operation, termed *paracenteſis*.

Before we perform this operation, we ſhould inquire if the ſtrength of the patient will enable him to undergo it; and then examine the belly, to diſcover whether it be ſufficiently filled with water; for unleſs by its tention and reſiſtance we find it ſo, the operation muſt be deferred.

The *apparatus* being ready, the patient ſhould be placed in an eaſy poſture, that he may continue in it till the water is diſcharged. He might be ſeated on a chair, but in that poſition he would be ſubject to faint before the water was all evacuated; or he may be laid ſideways on the edge of his bed; and this poſture I prefer, as being moſt convenient both for the patient and the operator.

In order to make the puncture, we are to chuſe the middle ſpace between the navel and the *criſta* of the *os ilium*, which is exactly between the fleſhy part of the oblique and tranſverſe muſcles, and the ſheath which they form, by the junction of their tendons, to encloſe the *muſculi recti*. The operation may be performed on either ſide indifferently, but if the fluctuation is more eaſily felt on

one

one ſide than the other, that ought to be choſen. If we diſtinguiſh any ſchirrous tumor in the *abdomen*, we are to avoid it by making the puncture on the oppoſite ſide. I have often performed it at the upper part of the lumbal regions, on account of a ſchirrous tumor which poſſeſſed the whole *hypogaſtrium*, and would not allow of my attempting it lower.

THE patient being properly ſituated, the next thing to be done is to place the aſſiſtants ſo as to ſupport him, and to preſs ſoftly upon different parts of the belly, in order to force the waters to that ſide where you propoſe to make the puncture. The ancients uſed a lancet for this purpoſe, but the *trocar* being much more convenient the uſe of the former is laid aſide. Previous to the operation, we ſhould draw out the *perforator* from the *canula*, leſt the point ſhould be ruſted in it; in which caſe, after the puncture had been made, we might run the riſk of pulling out the *canula* at the ſame time we withdraw the *perforator*.

IN performing the operation, I hold the handle of the *trocar* in the palm of my right-hand, placing the fore-finger along the *canula*, and puſh the inſtrument at once quite into the *abdomen*. I am certain the point is in the cavity, if it meets with no reſiſtance; when, taking hold of the *canula* with the left-hand, I introduce it a little farther into the belly, and with the other hand withdraw the *perforator*.

THE water now flows through the *canula*, and ſhould be ſuffered to do ſo till it is almoſt all diſcharged, unleſs the patient be faint; in which caſe, we muſt ſuſpend the evacuation, by putting

a finger upon the orifice of the *canula* till the fainting is gone off.

The water will ſometimes ceaſe running before it is all diſcharged, which is occaſioned by ſome of the parts that are floating within the cavity; as an inteſtine, or the *epiploon*, getting to the mouth of the *canula*, and ſtopping it up. In this caſe I introduce a pretty large probe into the *canula*, and remove the part that obſtructed the paſſage. It would be proper to have the probe bent at one end, leſt it ſlip accidentally out of the fingers, and paſs into the cavity.

All the water being diſcharged, I draw out the *canula* with one hand, whilſt, with two fingers of the other, I hold back the ſkin, which then preſſes much cloſer upon the pipe than when it was introduced.

The *canula* being drawn out, I put on ſome dry lint and a plaſter upon the wound, and order the patient to be put into bed; where we cover all his belly with a compreſs dipped in brandy, and ſecure it on with a napkin paſſed round his body. This napkin ſhould be tight enough to ſupply the defect of the abdominal muſcles, which have loſt their elaſticity by the diſtenſion they have ſuffered from the quantity of water. Theſe muſcles, in a natural ſtate, ſupported the weight of the abdominal contents, and eſpecially of the liver, which is attached to the diaphragm; but ceaſing to do ſo now, it is neceſſary that the napkin, by its tightneſs, ſhould ſupply their office, till the muſcles have recovered their ſtrength.

When there is an œdematous ſwelling in the *ſcrotum* and the lower extremities, the water will inſinuate itſelf into the *abdomen*, and ſoon fill it again; in which caſe the puncture muſt be repeat-

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ed, unleſs the texture of the blood be reſtored, and the urine reſumes its natural courſe.

Of encyſted Dropſies.

An encyſted dropſy is a collection of extravaſated water or *ſerum* encloſed in a *cyſtis*, and is found more frequently in the *abdomen* than any other part of the body. I ſhall not undertake to determine whether this extravaſation proceeds from a dilatation, or a rupture of ſome lymphatic veſſel; or whether it happens by the breaking of ſome membranous fibre: but this is certain, that we almoſt conſtantly find theſe cyſts formed in the cellular ſubſtance, which, we know, is no other than a *congeries* of ſeveral membranous *laminæ*: and the diſorder alſo generally happens on ſome diſeaſed part, already ſchirrous or diſpoſed to become ſo.

The water, as it extravaſates, diſtends the coats of the cavity in which it lodges, proportionably to its quantity; and thus the cyſts are formed. I have ſeen one of theſe cyſts, which was ſituated in the *abdomen*, diſtended to ſuch a degree as to contain five gallons of water. Having had opportunities, by diſſecting bodies, to view many of theſe caſes, I have often obſerved, that the cyſts increaſed in thickneſs in proportion as they enlarged in their bulk; inſomuch that I have ſeen ſome near a third of an inch thick, and adherent to all the parts with which they came into contact by their diſtention. Sometimes there is only one cyſt, but there may alſo be ſeveral together, placed by the ſide of each other. I have frequently found ſeveral little cyſts encloſed in larger ones, and attached to their internal

ternal ſurface by membranous fibres. I once found eight in one large *cyſtis*, which were almoſt as big as hens eggs.

SIGNS. This kind of dropſy, like the *aſcites*, has ſigns which are peculiar to, and diſtinguiſh it; and theſe are different according to the progreſs of the tumor. Soon after the diſeaſe begins, ſomething hard and circumſcribed may be felt at the place where the ſwelling is formed. This hardneſs is ſometimes fixed, and ſometimes moveable, and may prove to be either a ſchirrous tumor, or a watery ſwelling arrived as yet only to a certain ſize; but ſome time after we may feel the tumor conſiderably increaſed, and diſtinguiſh the nature of it. When it is a ſchirrous ſwelling, there is no fluctuation; but if it be a watery tumor, *i. e.* a *cyſtis* which is filling, a fluctation may be felt, though the tumor be hard, in much the ſame manner as we diſcover the *pus* in an abſceſs; and even the extremities of the cyſt, which ſpread in different directions, may likewiſe be diſtinguiſhed. The ſwelling is not attended with pain whilſt it continues of a moderate ſize; but when the *cyſtis* becomes conſiderably full, it begins then to be painful, acquiring, as was before obſerved, a greater degree of thickneſs; and therefore yielding with more difficulty to the increaſed quantity of the collected water. It alſo diſorders the parts upon which it preſſes, and thereby diſturbs the whole œconomy of the body. The urine is not yet changed, nor its quantity leſſened, neither is the patient ſo much troubled with thirſt as in the *aſcites*.

To conclude, if the *cyſtis* has been ſuffered to increaſe till it extends through the whole *abdomen*, the fluctuation of the water may be diſcovered in the

the ſame manner as was deſcribed in the *aſcites*, and upon feeling this fluctuation, many people, that have not attended a patient at the beginning of ſuch a diſorder, have miſtaken it for an *aſcites*. If there are ſeveral cyſts which are in contact one with another, it is almoſt impoſſible to diſtinguiſh them by the touch, becauſe the fluctuation is communicated from one cyſt to another. In proportion as the cyſt or cyſts grow full, the quantity of urine leſſens daily, and becomes of a lateritious colour, as in the *aſcites*, by the kidneys ſuffering a preſſure from the tumor. The thirſt is not yet violent; but frequently many other very troubleſome ſymptoms occur, proceeding either from the bad ſtate of the fluids which firſt cauſed the diſeaſe, or from the preſſure of the tumor upon all the *viſcera*, more particularly upon the inteſtines, which are generally found, upon opening bodies that have died of this diſeaſe, to be either thruſt on one ſide of the *abdomen*, or puſhed up into the *epigaſtrium*; and being thus removed out of their natural ſituation, and compreſſed, the freedom of their periſtaltic motion is impeded, and many ill conſequences thereby produced. If the internal ſurface of the *cyſtis* ulcerates, and begins to ſuppurate, the tumor ſoon becomes very painful, attended with a fever and *diarrhœa*; and if the puncture be made into it, the water that is diſcharged is either purulent or bloody. Having often made the puncture upon encyſted tumors of this kind, I have found the fluid of a bloody colour; and upon letting it ſettle, there has been two quarts of blood in about four gallons of the diſcharged liquor.

Prognostic. In order to form a right prognoſtic of this kind of dropſy, it is neceſſary to con-

consider its causes and progress. If it proceeds from a schirrous tumor upon which the *cystis* is formed, it is a symptomatic disease, the event of which depends upon that of the *schirrus*; and if the remedies prescribed for the *schirrus* are insufficient to dissolve it, the patient will die rather from the increase of that and other obstructions formed in different parts, than from the dropsy. I have frequently known this happen to women, who, at the time their *menses* left them, have been afflicted with these schirrous tumors and encysted *dropsies* at the same time. It is true, the dropsy may hasten their end, if the watery swelling is suffered to encrease till it fills the whole *abdomen*: Its pressure upon the parts will obstruct the secretions, and thereby changing the whole of the œconomy of the fluids, will produce the most fatal symptoms. Besides this, the internal coats will ulcerate and come to suppuration, as may be discovered by the signs we have already given upon that head: but if there is only a watery tumor, which, by being timely discharged, is not suffered to increase to any considerable size, the obstructions and the vitiated state of the fluids will then determine the patient's days, and not the dropsy, which in that case will be of little consequence. When the water is let out, proper remedies may then take place, if assisted by nature.

Cure. Upon a supposition there is but one cyst (which is discoverable at the beginning of the disease) there are two ways of emptying it. The first, by making the puncture with a *trocar*; the second by opening the *cystis* by an incision.

The resemblance between encysted dropsies and the *ascites* has occasioned their being treated in the same manner; nay, though the tumor was known

known to be encysted, the puncture with the *trocar* was deferred till the *cystis* was full and extended all over the *abdomen*; the consequence of which was, that after some repetitions of this operation, the patient died from the causes before related. The frequent opportunities I have had of opening the bodies of persons who have died of this disorder, and of observing the different progress it has made in different patients whom I have attended, has enabled me to distinguish these kind of dropsies perfectly; and to discover that punctures have been very proper in some cases, but by no means so in others. I would recommend the puncture therefore when there is only a single *cystis*, whilst it is yet small and of a moderate thickness; and I prefer this method not only because it is possible the *cystis*, when quite emptied, may not fill again, as sometimes has happened; but also because this operation, which is neither painful nor requires any dressing, answers the intention of cure, by preventing the growth of the *cystis*, and consequently its pressure upon the *viscera*. The essential point then, to repeat what I observed before, is to prevent the growth of the tumor by this operation; upon which account it must be performed as soon as ever the fluctuation of the water can be plainly perceived. If the *cystis* fills again, as most commonly happens, it must be emptied as soon as it is arrived to the same bulk as when the puncture was first made. If there are two cysts, and they are easy to be distinguished, it is almost impossible to empty them both by puncture the same day; for when the first has been evacuated by this operation, the other having then no pressure against it, subsides, and does not afford a sufficent resistence to the *trocar* to render the punc-

ture

ture either eafy or fafe. If the internal furface of the *cyftis*, fuppofing there is only one, begins to fuppurate, which may be known by figns before-mentioned; or if the *cyftis* is become large enough to extend through the whole *abdomen*, the puncture in this cafe would prove but a fmall relief, for the following reafons. Firft, if there are feveral cyfts inclofed in the large one, they will not be emptied with it, but continue intire. Secondly, if the internal coats fuppurate, we can neither apply the proper remedies, nor can the *pus* be difcharged. Thirdly, thefe great cyfts often fill again in lefs than three weeks, which foon deftroys the patient.

The puncture then, in thefe cafes, is ufelefs; and therefore I fhould prefer opening the cyfts by an incifion, which I have found of much greater fervice. It is true this method does not abfolutely cure the patient, but it prolongs his life; the *cyftis* is by this means emptied, and as it cannot fill again whilft the wound continues open, its fides draw near each other by their elaftic difpofition, and are affifted herein by the preffure of the neighbouring parts upon its circumference. Thus all the little orifices, through which the water made its way, are gradually clofed: hence likewife the internal parts of the *cyftis* fuppurate, as they approach near each other, and the pain ceafes. In fhort, by this means the fmall cyfts, which are very thin, and are inclofed in the great one, empty themfelves daily; and the membranes which form them, come away in pieces, by the fuppuration of the internal coats of the large *cyftis*. It may be objected, perhaps, that the incifion made into the *cyftis* is only changing one difeafe for another, as this opening produces a wound which

which muſt be dreſſed for a month or ſix weeks, and at laſt remains fiſtulous. But theſe inconveniences, when compared with the advantages reſulting from this operation, are of too little moment to induce us to prefer the puncture in theſe caſes.

It is eaſy to determine the proper place for opening the *cyſtis*. In caſes where the puncture with the *trocar* is preferable, we muſt chuſe the moſt depending part of the *cyſtis*, that it may be emptied entirely. The puncture is to be made in the ſame manner, and with the ſame precautions, as are directed in the *aſcites*.

If we propoſe to make an inciſion into the *cyſtis* in order to prevent its filling again, we muſt here likewiſe chuſe the moſt depending part, that what is to be diſcharged by ſuppuration may the more readily iſſue. The method of doing this, is by paſſing the point of a ſtraight biſtory quite into the *cyſtis*, and making an inciſion, of the breadth of four or five fingers, both in that and the teguments. Thus the water is immediately diſcharged, and the lips of the wound contracting, the inciſion ſoon afterwards is not above half ſo large as it was at firſt. In order to keep it open, we muſt introduce a flat, ſoft, linen tent, of ſuch a length and ſize as to reach into the *cyſtis*, without diſtending the lips of the wound. The tent ſhould be covered with a plaſter ſomewhat larger than the wound, and the whole kept on by proper compreſſes and bandages.

In four and twenty hours there will be a conſiderable diſcharge from the wound, which may make it neceſſary to put on freſh dreſſings. The chief end of the dreſſings is to preſerve the opening with a tent, without giving the patient pain,

 and

and in three or four days to throw ſome deterſive injections into the *cyſtis*, which will bring away ſeveral ſloughs upon the dreſſings. I have ſeen, after a few days, ſome water iſſue out again diſtinct from the *pus*, which certainly came from one of thoſe ſmall cyſts that are ſometimes found in a large one, and which had then burſt. Having made an inciſion into one of theſe large cyſts, which had not yet ſuppurated (for the colour of the water was unchanged), and throwing ſome injection into it, the patient was ſeized with a ſhivering whenever I did it; but this never happened when I injected into thoſe cyſts which had begun to ſuppurate before the operation was undertaken.

WHILST the *cyſtis* ſuppurates, its coats contract gradually like thoſe of the *uterus* after delivery, and the *cyſtis* ſeems to recede towards the ſchirrous tumor upon which it was formed, and which ſerved as its *baſis*.

THE wound, which has imperceptibly diminiſhed, ſtill remains fiſtulous; that is, there will be a ſmall opening, through which ſome drops of *pus* will daily diſcharge; and it muſt neceſſarily continue fiſtulous, becauſe the internal ſides of this great *cyſtis* will not unite together, as I am convinced from ſeveral inſtances.

As ſoon as the large *cyſtis* is emptied, the urine, which before was lateritious and but little in quantity, as in the *aſcites*, returns to its natural courſe and colour; and all the ſymptoms, which either the pain or weight of the *cyſtis* had occaſioned, abate or gradually go off.

I SHALL leave it to the phyſicians to preſcribe the proper remedies for diſſolving the ſchirrous tumors, correcting the juices, and reſtoring the

natural

natural evacuations; the defect of which may probably have produced the vitiated ſtate of the juices.

Of the Hydrocele.

THE *hydrocele* is a collection of extravaſated lymph or *ſerum* lodged in the *ſcrotum*. This diſeaſe is divided into two kinds, *viz.* one produced by infiltration or tranſudation, the other by effuſion. Of the firſt ſpecies is that where the water fills only the cellular texture of the *ſcrotum* and the *tunicæ vaginales*: the other kind of *hydrocele* is, when the lymph is collected in one ſingle cavity, as in a *cyſtis*. Theſe two diſtempers being quite different, I ſhall conſider them ſeparately.

Of the Hydrocele by infiltration.

THE *hydrocele* by infiltration may be either ſimple, or ſymptomatic and complicated, as being the conſequence of ſome other diſeaſe. The diſeaſes which uſually produce it, are the *aſcites*, the *anaſarca*, or the œdematous ſwellings of the legs and thighs.

Of the ſimple Hydrocele by infiltration.

THIS *hydrocele* generally affects the *ſcrotum* only. We frequently obſerve it in young children; for this part ſoaking continually in urine, occaſions an irritation there, and a diſtenſion; in conſequence of which, its cells are filled with a ſerous fluid: hence the *ſcrotum* becomes tranſparent, the ſkin loſes its redneſs, and, if preſſed, retains the mark of the finger; the *raphé* ſtill preſerving its ſituation in the middle of the *ſcrotum*.

The method of curing this diſorder, is either by fomentations made with lime-water and brandy, or the application of rags dipped in theſe liquors.

Of the ſymptomatic or complicated Hydrocele by infiltration.

The infiltration which cauſes the complicated *hydrocele*, does not affect the *ſcrotum* only, but extends farther. In this diſorder, the whole *ſcrotum* makes one tumor of a greater or leſs ſize, of a pale colour, indolent, and tranſparent; and retains the impreſſion of the finger. This œdematous ſwelling frequently ſpreads to the *penis*, rendering it very large, and contorted; and ſometimes the ſwelling extends to the *perinæum*. The *raphé* appears in the middle of the tumor, and ſeems to divide it into two equal parts.

The cauſe of this *hydrocele* is to be deduced from that of the diſtempers by which it is occaſioned: diſtempers in which the *ſerum* of the blood ſeparates, and overflows the parts.

It will be unneceſſary to particularize the diagnoſtic ſigns of this diſorder, ſince thoſe which are peculiar to, and diſtinguiſh it from, other *hydroceles*, have been mentioned in the foregoing definition.

As this *hydrocele* is only a ſymptomatic diſorder, and the almoſt neceſſary conſequence of the infiltration throughout the *membrana adipoſa* of the whole body, or at leaſt of the *abdomen*, legs, and thighs, the cure of it depends upon removing the cauſe of the original diſorder.

But though we cannot expect an abſolute cure of this ſort of *hydrocele* while the original diſeaſe ſubſiſts;

ſubſiſts; yet we are to endeavour, as much as poſſible, to ſtop the progreſs of it. The ſwelling of the *ſcrotum*, which increaſes to a monſtrous ſize in proportion as freſh *ſerum* infiltrates into it, may degenerate into a gangrene, which we muſt try to prevent by the application of diſcutient fomentations; and if theſe prove inſufficient, and the ſwelling increaſes ſo as to threaten a mortification, we muſt endeavour to prevent it by the aſſiſtance of ſurgery.

SOME propoſe to make an inciſion on each ſide of the *raphé*, full a finger's breadth deep. I have tried this method, and have found indeed that the water ran out very readily; but, before the fluids were quite diſcharged, and the *ſcrotum* returned to its natural ſtate, the inciſions began to cloſe, the evacuation leſſened, and in a few days quite ceaſed; ſo that it ſoon after became neceſſary to repeat the inciſions. Beſides, as the blood circulates very ſlowly in a part thus abounding with water, and where the natural heat is deficient, I have more than once known theſe inciſions attended with a gangrene. Theſe two inconveniences have induced me to prefer the making ſmall punctures in the *ſcrotum*, either with the *ſcarificator*, or the lancet, which will anſwer as well. Theſe punctures penetrate but ſuperficially indeed, yet the *ſerum* diſcharges through them as readily as by large inciſions. It is true, in a day or two they likewiſe require to be repeated, but ſtill are to be preferred, as they are free from pain, and therefore the patient will ſubmit to them as often as is neceſſary. In the next place, as they heal very well without dreſſing, they are not, like the large inciſions, ſubject to gangrene.

Of the Hydrocele by effuſion.

The *hydrocele* by effuſion, as was before obſerved, is a tumor or bladder of water lodged in the *ſcrotum*, and may be either ſimple, or ſymptomatic and complicated.

Of the ſimple Hydrocele by effuſion.

This kind of *hydrocele* is a tumor in the *ſcrotum*; in ſome degree tranſparent; of a round or rather oval figure; ſmooth and even in its ſurface; attended with little or no pain, and more or leſs hard; in which the fluctuation of a fluid is perceptible, and in which the finger leaves no impreſſion.

This watry tumor is ſituated upon one of the teſticles, to which it adheres; and as it ſometimes grows very large, it almoſt fills the whole *ſcrotum*, and preſſes againſt the *ſeptum*, ſo that the *raphé* ſeems to ſeparate the *ſcrotum* into two unequal parts. If there are two *hydroceles* by effuſion and equal in bulk, *viz.* one upon each teſticle, they may both be eaſily diſtinguiſhed by the touch; and the *raphé* then divides the *ſcrotum* into two equal parts. I have ſeen *hydroceles* which have contained a quart of fluid. The fluid or liquor with which they are filled is a ſort of lymph, reſembling urine in colour but not in ſmell, and, being warmed over a ſlow fire, becomes of the conſiſtence of a jelly. I have often ſeen theſe aqueous tumors, of the ſize of grapes, ſituated in different parts of the ſpermatic chord, and attended with a real *hydrocele* on the body of the teſticle. I have preſerved

ſerved an anatomical preparation, which ſhews four little tumors of this kind, round, and of the ſize of ſmall nuts; and which being formed between the membranes of the *peritonæum*, appeared outwards under the *ligamentum Fallopii*. This happened in a man who had a real *hydrocele* by effuſion, on the body of one of his teſticles. The reſemblance of theſe watry ſwellings to what are called *hydroceles*, renders it not improper to let them paſs under the ſame name.

It is very difficult to determine what may be the cauſe of the ſimple *hydrocele*. I was at firſt inclined to think it might be produced by ſome ſlight diſorder of the teſticle, having often ſeen it appear after a blow, fall, or ſtrain of that part. I imagined that ſome of the fibres which connect the membranes of the *tunica vaginalis* might by this means have been broken; but reflecting that thoſe little tumors above-mentioned, which accompanied real *hydroceles*, were of the ſame nature; and, like them, were ſituated either in the cellular ſubſtance of the *tunica vaginalis*, or in that of the *peritonæum* near the *ligamentum Fallopii*; I am perſuaded that the *hydrocele* is produced either by a vitiated ſtate of the lymph, or a diſorder of the *peritonæum*. I ſhall look upon it therefore as a ſort of encyſted dropſy, ſuch as is often found in one of the *venters*. I have already obſerved, in treating of the dropſy, that theſe *cyſts*, when ſituated in the *abdomen*, have been diſtended ſo as to contain a large quantity of fluid, and have been miſtaken for the true *aſcites*.

It is unneceſſary for me to mention the ſigns peculiar to this kind of *hydrocele*, as it would be only a repetition of what has been ſaid in the definition.

The cure of this diſorder is either palliative or radical.

The palliative cure is performed by emptying the *cyſts* by a puncture with a *trocar*.

It is called palliative, becauſe the *cyſtis* will fill again after it has been emptied; and will require the operation to be repeated, ſooner or later, according to the time it takes in filling.

The radical cure is a more conſiderable operation, and intended to remove the diſorder intirely without being ſubject to a return. In regard to the performing either of theſe operations, the choice ſhould be left to the patient. The palliative cure is very expeditious, is performed almoſt without pain, and does not require any dreſſing; and this is what I would propoſe for grown people. The radical cure is not to be effected without an operation that is attended with more pain than the puncture, and for ſix weeks, or thereabouts, requires to be properly dreſſed. This, however, is the method which I would recommend for children, who, having ſo large a ſpace of time in proſpect, ought not to be ſubjected to the repetition of an operation during life.

Of the Puncture. In order to perform this, it is proper the *cyſtis* ſhould be full, that the *trocar* may penetrate it more eaſily. The patient being ſeated, I compreſs the tumor, with the help of an aſſiſtant, in ſeveral places, but particularly in the ſuperior part, to render the tumor more tenſe: taking care, as the teſticle lies underneath, not to hurt that: then, chuſing a point where no large blood-veſſels appear under the ſkin, I pierce the tumor, with the *trocar*, quite into the water, obſerving not to puſh it ſo far as to wound the teſticle. This done, I draw out the *perforator* with one

one hand, whilſt, with the other, I puſh in the *canula* a little farther. I hold the *canula*, during the diſcharge of the water, till juſt before it is all run out, when I let it go, leſt by continuing to hold it, the extremity ſhould touch the internal ſurface of the *cyſtis*, and by its irritation occaſion an inflammation upon that and the whole *ſcrotum*. When all the water is diſcharged, I fix the ſkin with two fingers of one hand, and draw out the *canula* with the other. A little dry lint kept on with a plaſter is ſufficient for the dreſſing, taking care only to ſupport the *ſcrotum* with a ſuſpenſory.

It may be aſked, whether, before the *canula* is removed, the injecting ſome deſiccative medicine through it, which might cloſe up the mouths of thoſe veſſels that diſcharge the lymph into the cyſt, and letting it out after it has been confined there a little, would not be ſufficient to procure an union of the ſides of the cyſt; but this method could never ſucceed, from the impoſſibility there would be, after the injection had been uſed, of bringing the ſides of the *cyſtis* exactly into contact, and of keeping them ſo; beſides which it might be liable to produce an inflammation.

Of the radical cure. The operation by which the *hydrocele* is radically cured being of more conſequence than the puncture before-mentioned, the patient muſt be prepared for it by bleeding, and a proper regimen.

The dreſſings being ready, and the patient laid upon a bed, I make an inciſion into the *ſcrotum* the whole length of the *cyſtis*, dividing the *cyſtis* at the ſame time. The water being diſcharged, the coats of the *cyſtis* contract a little. If the diſeaſe be recent, the *cyſtis* is very thin, and as it

will ſoon ſuppurate, it would be unneceſſary to meddle with it; but, if the cyſt has been long formed, it is grown thick, and very large; in which caſe part ſhould be taken off. In order to do this, I take hold of the ſides of the cyſt between my fingers, and cut away as much of it as poſſible, and with it part of the *ſcrotum*.

We are to take care not to cut the ſpermatic veſſels that adhere very cloſely to it, which we could not avoid doing if we were to extirpate the *cyſtis* intirely: as part of it therefore muſt neceſſarily remain, we moiſten the inſide of the wound with alum water, which purſes it up, and produces a ſuppuration of the remainder of the *cyſtis*; ſo that the fleſh, after the eſchars are fallen off, appears granulated and firm, and the wound requires no other dreſſing afterwards than what is common to ſimple wounds. It is proper however to obſerve that, as ſoon as the fleſh begins to grow red, we muſt avoid uſing unctuous medicines, as ſuch applications are particularly ſubject to produce a *fungus* in theſe parts.

Of the ſymptomatic Hydrocele by effuſion.

The ſymptomatic *hydrocele* by effuſion proceeds from ſome other diſeaſe, which occaſions a watry tumor or bladder in the *ſcrotum*, like that which we have juſt been ſpeaking of: like that too, it is of a larger or ſmaller ſize, according to the quantity of water collected in it, and is accompanied with a fluctuation. There is however ſome difference between theſe tumors, as we ſhall ſoon ſee.

There are two diſeaſes which may produce this kind of *hydrocele*. The firſt is that ſpecies of dropſy termed *aſcites*, when the patient has at the

ſame time an hernial cyſt, which extends into the *ſcrotum*, and is the conſequence of a complete *hernia.* This kind of *hydrocele* does but rarely happen, at leaſt I have never ſeen it above twice. The ſecond, which is more common, is a diſeaſe of the teſticle.

The Hydrocele formed by a cyſtis hernialis.

SUPPOSE a perſon has an *hernia inguinalis*, and he becomes dropſical; a truſs, by preſſing upon the ring, may ſupport the inteſtine or *epiploon*, ſo as to keep them from falling down into the *cyſtis*; but, notwithſtanding this, part of the water that is extravaſated into the *abdomen*, will paſs down into the *cyſtis* and fill it. Nay, it is poſſible, though the *hernia*, by the uſe of a truſs, has been long cured, that the *ſacculus hernialis*, which always remains, and whoſe entrance or mouth never cloſes exactly, nor its internal ſides unite, unleſs from an inflammation of thoſe parts; it is poſſible, I ſay, that the *cyſtis* may be filled by ſome of the water which is diffuſed in the *abdomen*. In either of theſe caſes, the ſwelling of the *ſcrotum* is ſmooth, and free from pain; but of a longer ſhape than other *hydroceles*. I made the puncture once with the *trocar* in this kind of *hydrocele*, and the extravaſated water was diſcharged, but the internal opening made by the *trocar* in the *hernial ſac* probably not cloſing ſo ſoon as that in the external ſkin, a prodigious quantity of water inſinuated itſelf into the whole cellular ſubſtance of the *ſcrotum*, inſomuch that it became twice as large as one's head: undoubtedly this water came from the *abdomen*. In leſs than a fortnight, this laſt *hydrocele*, which proceeded from infiltration, was diſ-

diſſipated; the opening that had been made in the *ſacculus* being in that time very likely cloſed; but the *hydrocele* of the *hernial cyſt* ſoon appeared again; from whence we may infer, that this diſeaſe cannot be cured, but by curing the *aſcites* which occaſioned it. In my *Obſervations*, page 260, there is an account of another *hydrocele* contained in an *hernial ſac*, the entrance of which was cloſed; but this ſort of *hydrocele* is very uncommon.

Of an Hydrocele from a diſeaſed Teſticle.

THERE are many diſorders that affect the teſticles, and theſe diſorders have different degrees; but they are not all complicated with *hydroceles*.

THAT kind of *hydrocele* which is formed on a diſeaſed teſticle, hath, as well as others, its degrees of increaſe; but is attended with this particular circumſtance, that it depends entirely upon the event of the diſeaſe in the teſticle; and therefore it is very rare that it continues for any time without ſome ſupervening accident, whereas the ſimple *hydrocele* may remain, without any conſiderable inconvenience, to extreme old age.

WHEN the *hydrocele* is ſimple, and conſiderably large, it is very difficult to diſtinguiſh the teſticle; but in that which is complicated, and where the ſize of the teſticle is increaſed, it may eaſily be perceived; and the more ſo, as it is generally very hard. In ſhort, that which is ſimple is always free from pain; whereas this becomes painful if the teſticle impoſthumates or turns cancerous, as frequently happens.

WHILST the diſorder of the teſticle does not increaſe, we can only propoſe a palliative cure,

proceed-

proceeding no farther than the puncture; but if it augments to a certain degree, we must by all means perform the operation of castration, unless the patient be unable to undergo it.

If this operation be necessary and practicable, the *hydrocele* that accompanies the disease of the testicle, occasions no other difference in performing the operation than that of making the ligature of the spermatic chord above the *cystis*, in order to extirpate the whole together.

The *hydrocele* by effusion, of what kind soever, may be partly covered by a *sacculus hernialis* of a greater or less size, and filled with a portion of the *epiploon*; which case I have seen. The *hernia*, which was very large, covered almost all the *hydrocele*, though there was near a pint and a half of fluid contained in it; the whole together making a swelling, of which it was so much more difficult to form a judgment, as it was very painful from the violent extension of the *cystis*; which reached through the ring quite into the *abdomen*, notwithstanding the hernial cyst.

In such cases where the puncture is to be made, the operator cannot be too careful to avoid pricking either the *cystis hernialis*, or the testicle. If castration is to be performed, he must in the like manner have a regard to the hernial sac, supposing he cannot reduce the *hernia*.

OF

OF THE DISEASES of the TESTICLES.

EACH of the testicles is described by anatomists as a conglomerate gland, situated in the *scrotum*, and serving to separate the *semen* from the blood for the propagation of the species. The vessels belonging to them pass through the cellular substance of the *peritonæum*, which, in the ring of the *obliquus externus*, collects them together in the form of a chord. This cellular membrane, extending still farther, incloses the testicle, and forms the *tunica vaginalis*. The whole is covered by the *musculus cremaster*, which, taking its origin near the ring, assists the *peritonæum* in suspending the testicle in the *scrotum*.

THE testicles and their teguments may be affected with the same diseases as the other soft parts; and besides these, they have likewise disorders peculiar to themselves. They may all proceed from external causes, as blows, compression, puncture, or incision; or they may arise from a general vitiated state of the juices; and sometimes from a simple obstruction only, the fluids being then no otherways in fault than merely from a defect in their circulation: at other times they are produced from a change in the state of these suppressed fluids; and oftentimes from a critical or symptomatical defluxion upon these parts, proceeding from a venereal or cancerous *virus*. A disorder of the testicle therefore may be simple; it may become otherwise by the corruption of the fluids which stagnate there; and, if arising from an

an internal *virus*, it may be complicated with other ſymptoms, proceeding from the ſame taint.

MOST authors have comprehended all theſe diſeaſes under the general name of *ſarcocele*, as if, in conſequence of ſuch diſeaſes, the teſticle became a fleſhy ſubſtance, and troubleſome no otherways than by its increaſed bulk: but daily experience ſhews us, that theſe diſorders are very different one from another; and we ſee even each particular ſpecies of them is liable to many changes and alterations; thoſe which appear moſt ſimple, and are produced by external cauſes, ſometimes degenerating into a *carcinoma* and a *cancer*.

THESE diſorders, in their firſt appearance, cannot without difficulty be diſtinguiſhed as to their nature, unleſs the true cauſe be diſcovered by preceding circumſtances, or by their being attended with ſome other illneſs ariſing from the ſame ſource. In general, therefore, it is from their progreſs, only, that we are able to diſcover their true characters. This progreſs may be more or leſs quick, and in its conſequences more or leſs conſiderable: thus the tumor may remain a long time merely ſchirrous, without increaſing much; or it may increaſe in a little time, and ſtill retain the nature of a *ſchirrus*. It may change likewiſe very ſoon to a carcinomatous ſtate, and may not degenerate into a cancer but imperceptibly and after a long continuance. The ſwelling, as it increaſes, may alſo extend to the ſpermatic chord: and this is what is moſt to be apprehended; eſpecially if it is diſpoſed to be carcinomatous, or is become ſo by the corruption of the fluids therein confined.

I HAVE known the ſpermatic chord grown very much enlarged, and ſometimes very hard, not only

only below the ring of the *obliquus externus*, but alſo extending conſiderably higher into the *abdomen*. In other caſes I have obſerved that the chord ſeemed ſound from the teſticle to the ring; but by tracing and carefully feeling it through the ſkin and the abdominal muſcles, I have found out ſome ſmall tumors here and there, ſhaped like olives, proceeding from the ſame cauſe and being of the ſame nature with the diſorder of the teſticle. I have ſeen likewiſe another inſtance of theſe tumors, which grew within the cavity, and ſwelling even to the ſize of one's head, killed the patient in leſt than ſix months.

PROGNOSTIC. The prognoſtic of this diſorder, which is to be gathered from the nature of the tumor, ought to be given with great caution at the beginning of the diſtemper, as it is then very difficult to be diſtinguiſhed: but this uncertainty does not continue long, for the diſorder, either by eaſily yielding to internal medicines with the application of proper topics, or by its reſiſtance to theſe means, ſoon diſcovers to us whether the ſwelling is ſimple, or whether it proceeds from a venereal or cancerous *virus*; as alſo whether it can be cured without an operation, or can be removed only by extirpation.

THE worſt conſequences are to be apprehended, if the ſpermatic chord is diſeaſed within the cavity of the *abdomen*, as the operation is then ſcarce practicable, from the difficulty and even danger of making the ligature upon the chord higher up than the ring of the *muſculus obliquus*. See my *Obſervations*, p. 259. Nevertheleſs this method has ſometimes ſucceeded, and probably it was when the chord was but little ſwelled, and the diſeaſe proceeded not from any internal cauſe.

CURE.

CURE. It may be urged, that when the teſticle is ſo diſeaſed as to be incapable of ſecreting the *ſemen*, it ought to be extirpated as an uſeleſs member; but a perfect cure is not always the object of our endeavours, it being equally proper, at leaſt upon ſome occaſions, to palliate ſuch diſorders as will not admit a perfect cure with ſafety: I would propoſe therefore, that we ſhould not proceed to caſtration, till we find the diſeaſe is not curable by the help of a proper diet and medicines, but on the contrary increaſes daily, and is likely in time to become incurable, even by this operation. It is not in all caſes that the operation is practicable, which may be owing to a diſorder of the ſpermatic chord, as well as to a diſeaſed ſtate of the teſticle. If the ſpermatic chord is not affected (which we ſhall be able to judge of by carefully examining and comparing it with that of the other teſticle), we may and ought to proceed to caſtration; but if the ſpermatic chord is very much ſwelled, or hard, I ſhould not venture to adviſe it. I know indeed it is the only abſolute remedy, and has ſometimes been performed with ſucceſs; but I conſider alſo, it is too much expoſing the credit of the profeſſion, and that the moſt juſt and beſt-grounded prognoſtic will not always ſecure us from reproach, when the diſeaſe is not removed, or returns again after the operation. It is agreed, that by dilating the ring of the *muſculus obliquus*, and extending the inciſion along the body of the muſcle, we may follow the chord between the *laminæ* of the *peritonæum*, and divide it a good deal above the ring; but the inflammation which muſt almoſt neceſſarily ariſe in the *peritonæum* and all the *abdomen*, in conſequence of ſuch an inciſion, is an objection

that prevents my approving this method. See in my *Obſervations*, page 259, an account of ſuch an operation, which proved unſucceſsful from an inflammation ſeizing on the whole belly. It will be prudent therefore in the ſurgeon to conſider every circumſtance, in order to form a right judgment whether the operation is likely to be attended with ſucceſs, or not.

SUPPOSING every thing appears favourable, the patient muſt be prepared by a proper regimen, evacuations by bleeding, and purging, and ſuch other remedies as are ſuitable to the caſe. The patient being laid upon his back, with his hands and legs held faſt by aſſiſtants, I take up the ſkin of the *ſcrotum* with two fingers juſt upon the tumor, while an aſſiſtant does the ſame, and I divide it with a biſtory; then I lay bare the chord, either by diſſecting or tearing the cellular ſubſtance which covers it, dividing alſo the *cremaſter* muſcle longitudinally; by which means I clear the chord in ſuch a manner that all the veſſels of which it conſiſts are laid plainly in view. This chord is compoſed of a nerve, a ſmall artery, ſeveral veins, and the *vas deferens*. Of theſe none except the artery ever give any trouble, and that by bleeding after the chord is divided. I take it therefore between two fingers, where it goes over the *os pubis*, and with it the veins that ſurround it, and paſs a needle armed with two pieces of waxed thread between theſe veſſels and the *vas deferens*; the laſt of which may be diſtinguiſhed by its hardneſs. This done, I draw away the needle, leaving the thread in order to make the ligature if neceſſary. Immediately I take hold of the veſſels below the *os pubis*, and ſqueeze them between my fingers ſo as to make a ſort of contuſion,

ſion, and then cut off the chord, a little below the bruiſed part. I next divide the *ſcrotum*, till I come under the diſeaſed teſticle, and with my fingers ſeparate the teſticle from the cellular membrane, which connects it to the *ſcrotum*. If any difficuity is found in ſeparating the membranous parts, I divide them with my ſciſſars; and if I find, after the teſticle is extirpated, that the *ſcrotum* has been too much diſtended by the largeneſs of the tumor, I cut part of it off.

It may be aſked, perhaps, why I don't make the ligature of the chord immediately below the ring, as authors direct? And likewiſe, why I do not include the whole chord in the ligature? To which I anſwer, firſt, that if the ligature ſlips, we cannot poſſibly tie the artery again, becauſe it retires above the ring; where it may diſcharge blood into the cellular ſubſtance of the *peritonæum*, and thereby deſtroy the patient, as has been known to happen. Secondly, that of the ſeveral parts of the chord, none but the artery will bleed; why then ſhould the *cremaſter* muſcle, the *vas deferens*, and the nerve, be tied with it? We are ſenſible that convulſive motions have enſued from this method of making the ligature upon them all. Was it the ligature of the nerve that produced theſe motions, or did they ariſe from its being made upon the *vas deferens*, the texture of which we know is almoſt tendinous? If bruiſing the extremity of the artery is not ſufficient to ſtop the hæmorrhage, a ſmall pledget of lint dipt in ſtyptic water, and preſſed dry, will anſwer the purpoſe when applied to the end of the divided chord; and eſpecially as the chord is cut below the *os pubis*, that bone will ſerve to ſupport a compreſſion. But ſuppoſing, after all, the

artery ſhould bleed, the thread is ready paſſed, and the ligature may be made.

If the ſpermatic chord is ſwelled almoſt as high as the ring, we cannot uſe this method, but the ligature muſt abſolutely be made immediately below the ring. If the ſwelling extends higher than the ring, and we cannot avoid proceeding to the operation, there is no ligature at all to be made in this caſe; but, dilating part of the ring we are to divide the chord, and the artery will not bleed.

Sometimes the artery of the *ſeptum ſcroti* will bleed. When this happens, we muſt endeavour to diſcover the place where it is opened, and make a ligature upon it: or elſe apply a little lint dipt in ſome ſtyptic water upon the orifice, directing an aſſiſtant to hold his hand upon the dreſſing for a quarter of an hour or thereabouts. The reſt of the wound is to be dreſſed with dry lint, and the whole kept on by a bandage, applied ſo as not to preſs upon the other teſticle.

The firſt dreſſings ſhould remain on ſome days; for as theſe parts are deſtitute of fat, the dreſſings are ſome time before they are moiſtened by the diſcharge; and upon this account it would be proper to ſoften them a day or two after the operation with oil of St. John's wort, or melted lard. Upon removing them, a finger ſhould be applied to the doſſil that ſtopt the hæmorrhage, that it may remain on till looſened by the ſuppuration. The reſt of the dreſſings require nothing of a different nature from other wounds; yet one caution may be neceſſary to the young practitioner, which is, that he ſhould leave off unctuous applications as ſoon as poſſible; otherwiſe a looſe flabby fleſh will ariſe in

in the wound, which will be very difficult either to be deſtroyed, or conſolidated..

Of the Phimoſis.

THE *prepuce* is formed by a continuation of the ſkin of the *penis*, which ſerves to cover the *glans* when the *penis* is not erected, and to allow for the extenſion of the *penis* when erected; at which time this portion of the ſkin that formed the *prepuce* does not cover the *glans*, but falls back upon the *penis*, and ſerves to cover part of that.

THE *phimoſis* is a conſtriction or ſtraitneſs of the extremity of the *prepuce*, which preventing the *glans* from being uncovered, is often the occaſion of many troubleſome complaints. It may ariſe from different cauſes, both in children and grown perſons.

The Phimoſis of children.

CHILDREN have naturally the *prepuce* very long, and as it exceeds the extremity of the *glans*, and is not liable to be diſtended, it is apt to contract its orifice. This often occaſions a lodgment of a ſmall quantity of urine between that and the *glans*, which, if it grows corroſive, may irritate the parts ſo as to produce an inflammation. In this caſe the extremity of the *prepuce* becomes more contracted, and conſequently the urine more confined. Hence the whole inſide of the *prepuce* excoriates and ſuppurates; the end of it grows thick, and ſwells; and in ſome months becomes callous. At other times it does not grow thick, but becomes ſo ſtrait and contracted as hardly to allow the introduction of a probe.

THE only way to remove this diſorder, is by the following operation. I hold the extremity of the *prepuce* with two fingers; and introducing a director at the orifice, I paſs it on till the end of it touches the *corona glandis*. I then ſlide a ſtraight biſtory along the groove of the director, the point of which having reached the *corona*, I cut through the *prepuce* from within outwards, and carry on the inciſion in the ſame manner through the whole *prepuce*, by drawing the edge of the biſtory towards me: this inciſion ſhould be made on the ſide of the *penis*. The internal membrane of the *prepuce* ſhould be cut quite into the *corona*, where it terminates; and if it is not intirely divided by the firſt inciſion, we finiſh the operation with the ſciſſars.

IF the end of the *prepuce* is grown thick or callous, it is better to cut it quite off, ſince the ſuppuration here, being generally inconſiderable, will not be ſufficient to ſoften it. This operation is the very ſame with circumciſion. The wound will bleed a little, but the blood may eaſily be ſtopped by the application of a pledget of lint, held on a few minutes by the hand: for the *penis* is ſo ſhort, eſpecially in young children, that no bandage can be applied that will keep on. The blood being by this means ſtopt, we lay on ſome more lint and a plaiſter.

EVERY time the child makes water, the nurſe muſt take care to renew the dreſſings, and in ſeven or eight days this ſmall wound will be healed.

Of the Phimoſis in grown perſons.

A PHIMOSIS may affect grown perſons from the ſame cauſe as little children, and may be cured by

by the ſame operation; nor will there be any other difference except in the dreſſings, which may be more regular by allowing the application of a bandage.

THOUGH there are ſome grown perſons who cannot uncover their *glans*, or at leaſt not without pain, and yet have not the extremity of the *prepuce* ſo contracted as to confine the urine from paſſing, we notwithſtanding find them ſometimes troubled with a *phimoſis*; which might be ſuſpected to ariſe from a venereal taint, but has in reality a much more innocent cauſe. There are, we know, ſebaceous glands ſituated in the *prepuce* round the *corona*, which ſecrete an unctuous humour that paſſes through their excretory ducts. This humour ſometimes becoming acrimonious, irritates the ſkin that covers the *glans*, and the irritation extending to the internal membrance of the *prepuce*, they both become inflamed, and yield a purulent *ſerum*; which cannot be diſcharged, becauſe the *glans* is ſwelled, and the orifice of the *prepuce* contracted. I have often ſeen theſe diſorders cured in two or three days, by frequently injecting wine, or ſome other deſiccative liquor, under the *prepuce*, which waſhes and brings away the matter that was lodged there, and heals the excoriations of the *prepuce* and *glans*. If theſe injections ſhould prove ineffectual, we muſt then proceed to the operation.

WE find alſo ſome grown perſons, who, though they have never uncovered the *glans*, have been ſubject to a *phimoſis*, from a venereal cauſe. In ſome it is owing to a *gonorrhœa*, where the matter lodging between the *prepuce* and the *glans*, occaſions the ſame excoriations as the diſcharge before-mentioned from the ſebaceous glands. This

accident may likewiſe be removed by injections. In others it proceeds from venereal chancres on the *prepuce*, the *glans*, or the *frænum*; which producing an inflammation either on the *prepuce*, or *glans*, or both, the extremity of the foreſkin contracts and prevents the diſcharge of the matter. The parts, in a very little time, are greatly tumified, and I have ſometimes known a gangrene come on in leſs than two days.

In ſuch caſes, injections will not be ſufficient: we may indeed waſh the inſide of the *prepuce*, but cannot dreſs the chancres, and therefore muſt proceed to the operation before deſcribed. The inciſion is to be made at the moſt convenient part for dreſſing the chancres afterwards; obſerving only to avoid, if poſſible, making it juſt on the *dorſum penis*, becauſe the blood-veſſels are there largeſt. If there is a chancre on the *frænum*, that too muſt be divided.

The dreſſings in this caſe have nothing particular: they muſt be ſecured by a proper bandage, and the *penis* kept raiſed towards the belly to facilitate the return of the fluids.

I ſhall ſay nothing of the method of treating the chancres, as that would require a particular diſſertation.

Of the Paraphimoſis.

The *paraphimoſis* is a diſorder wherein the *prepuce*, being retracted towards the root of the *penis*, cannot be returned again over the *glans*, but makes a ſort of ligature behind the *corona*.

This diſeaſe is eaſily known: the *glans* is uncovered; the ſkin tumified on the *corona*, and above it forms a circular collar or ſtricture, which, from

from the ſkin being unequally extended, becomes indented, and makes ſeveral rings round the part. This diſeaſe may proceed from two cauſes; as firſt, from the imprudence of young people, and ſometimes alſo of grown perſons, who having the end of their *prepuce* too ſtrait, cannot uncover their *glans* without pain, and when they have done it, neglect returning it ſo ſoon as they ought: and thus the contracted part of the *prepuce* forms a conſtriction behind the *glans*. Soon after, the *glans* and *penis* ſwell, and the *prepuce* being conſequently very much diſtended, is affected in the ſame manner; an inflammation ſeizes upon both, and cryſtallines quickly appear upon the ſtricture formed by the *prepuce*, ſo that the whole may be liable to a gangrene, if not ſpeedily relieved. Such is the progreſs of this diſtemper.

As all theſe ſymptoms will certainly enſue from the ſtricture formed above the *glans* by the contracted *prepuce*, we muſt endeavour as ſoon as poſſible to return the *prepuce* back again, by drawing the ſkin over the *glans* on each ſide. The manner of doing this cannot well be deſcribed, but the principal circumſtance to be obſerved, is to bring back the internal membrane of the *prepuce*. If that cannot be done, and the inflation or ſwelling of the *prepuce* be ſlight, we muſt endeavour to relax it with emollient cataplaſms, often repeated; but if, notwithſtanding this, we find the ſymptoms increaſe, we muſt proceed to the operation in the manner following.

The *penis* being held, I take a crooked and ſharp-pointed biſtory, and turning the back of it towards the *penis*, I introduce the point under all the rings one after another, and divide them from within outwards. If we were to begin the inciſion

on

on the outſide, we ſhould do it but imperfectly, if at all. I afterwards make three or four ſcarifications in the collar or ſtricture, dividing it tranſverſly, that is, lengthways of the *penis*: by the inciſion through the rings, I divide thoſe kind of ligatures, which they formed, and by which the ſwelling was produced; and by the ſcarifications, I open a paſſage for the gangrenous *ſerum* that was inſinuated into the ſtricture by the ſtrangulation.

The wounds will bleed a little, but the hæmorrhage is ſoon ſtopt, by wrapping ſome dry lint round the *penis*, with a fine rag over that, kept on by bandage. The blood coagulating in the wound will be ſufficient to ſtop the hæmorrhage, and in an hour's time they may be dreſſed with a digeſtive, in order to bring on a ſuppuration. As the firſt dreſſings grow dry, and ſtick to the parts, it would be proper to moiſten them with a little brandy before they are taken off, or they would be liable to give pain to the patient in removing them.

It ſeems reaſonable, that as the diſeaſe was occaſioned by the *glans* being uncovered, we ought immediately to cover it again, after the operation is finiſhed; but this cannot be done till the cure is completed. The whole intent of making the inciſions was to enlarge the *prepuce*, and prevent its cauſing a freſh ſtrangulation.

The ſecond thing that may produce a *paraphimoſis*, is a venereal *virus*. In adults, whoſe *glans* is uncovered, there frequently ariſe venereal chancres in the *prepuce* after impure coition, which, before they digeſt, are generally attended with an inflammation, more or leſs conſiderable. This inflammation is alone ſufficient to render the *prepuce* too ſtrait for the ſize of the *penis*; in conſequence of which a ſwelling or inflation may enſue, like

that

that before-mentioned; and this is what is termed a *paraphimosis*. If the swelling is so considerable as to threaten a gangrene, we must proceed to the same operation as was before described, taking care not to make the incision at the place where the chancres are situated, supposing the swelling will allow us to discover that. In this case the incisions do not heal so soon as the former, and the swelling abates but slowly; for the inflammation, occasioned by the chancres, will continue till they suppurate. The operation then, in this case, serves only to set the skin at liberty, which the inflammation had rendered too strait for the size of the *penis*, and to open a passage for the serous matter that the swelling had occasioned to stagnate there. The swelling will not abate much till the chancres are brought to suppuration, nor will it be intirely reduced till the venereal *virus* is thoroughly corrected by remedies proper for that disease.

Of the amputation of the penis.

THE *penis* being subject to the same diseases as the other soft parts, it may, like them, be liable to an inflammation, and a gangrene, arising from schirrous tumors, a cancer, *&c.* I have seen the *glans* very large, hard, and carcinomatous, and sometimes almost intirely eroded by a cancerous ulcer. When this is the case, the only means of cure is by the amputation of the *penis*; the manner of performing which I shall here describe, though it has not been taken notice of in any treatise of operations that has hitherto been published.

THIS

This amputation is performed in a very different manner from thoſe of other members, and requires therefore very different precautions. It ought, however, like the other amputations, to be made in a ſound part, or it will not anſwer its deſign.

The patient having been properly prepared, I order the *pubis*, *ſcrotum*, and *perinæum* to be ſhaved, and then direct him to make water, that he may have no occaſion to do it again till ſome hours after the operation.

The patient being placed in a chair of a convenient height for the operator, an aſſiſtant takes hold of the *penis* at its root near the *pubis*; and as the ſkin of the *penis* is very looſe, and longer than the *corpora cavernoſa*, I draw it down towards the *glans*, in order to take off a larger ſhare of that than of the cavernous bodies; for immediately after the operation is over, what remains of theſe recedes towards their origin under the *os pubis*. I likewiſe draw down the *penis* a little by taking hold of the *glans*, and with one ſtroke of the biſtory cut through it at the proper place, *viz.* in the ſound part. This done, I introduce into the *urethra* a ſilver or leaden pipe, of the bigneſs of a middle-ſized *catheter*, and of a length proportionable to the remaining part of the *penis*. The pipe ſhould have two ſmall ears, to prevent its ſlipping into the *urethra*, and theſe ears are to be perforated to admit a ſmall ribbon through them; which ribbon is to be ſpread with plaiſter, and fixed along the remainder of the *penis* to keep the pipe in its place. We muſt then endeavour to ſtop the hæmorrhage, which is ſometimes very conſiderable.

The blood ſeldom ſprings out unleſs ſome conſiderable large artery be divided; in which caſe we muſt

muſt make a ligature upon it with a needle and thread. The blood commonly diſcharges from the *corpora cavernoſa*, as if ſqueezed from a ſponge, and therefore cannot be ſtopt by any other means than by ſtyptics and compreſſion. For this purpoſe we apply a pledget to the wound dipt in ſome ſtyptic water, covering it with a round compreſs of the ſame breadth, but very thick, and order the whole to be held on by an aſſiſtant, preſſing upon it for half an hour or an hour. The ſtyptic contracts the cells of the *corpora cavernoſa*, whence the blood iſſues, and coagulates it there ſo as to ſtop the paſſage of the freſh blood, which might otherwiſe paſs out.

When the hæmorrhage is ſtopt, which may be known by the dreſſings being dry, we ſecure the lint by a plaiſter cut in a crucial form; having a hole in it oppoſite to the end of the pipe for the paſſage of the urine, and fixed along the *penis* as high as the *abdomen*, and down upon the *ſcrotum*. If enough of the *penis* is left to allow the dreſſings to be faſtened on by a circular bandage, that ought to be applied; and the patient ſhould be kept very ſtill, otherwiſe they would be apt to come off. The like care ſhould be taken whenever he makes water.

The pledget is not to be removed till it falls off by the ſuppuration; after which there is nothing particular required more than in other wounds.

When the wound digeſts, we may omit putting the pipe into the entrance of the *urethra*, ſince there will not then be any room to apprehend the cloſing up the paſſage in a few hours, as might have

have happened by neglecting to introduce it immediately after the operation. But when the cicatrix is about to form at the *urethra*, the pipe must be again made use of to prevent the entrance of it being too much contracted. For want of a pipe being immediately introduced after the operation, I have known the *urethra* so closed up, that in five or six hours the patient could not make water. Whether enough of the skin had not been taken off, or whether the *corpora cavernosa* had retired too far up towards their origin, the skin was inflated over the wound, and closed it so all round, that it could scarcely be seen. It was with no small difficulty that the entrance of the *urethra* was at last found out; nor could it have been distinguished, but by pressing the finger several times upon the wound, to feel where the urine endeavoured to force a passage. The surgeon then applied the point of his lancet there, and the urine was discharged in a full stream; but having no pipe in readiness, he passed a *catheter* into the bladder till one could be made.

Of the Fistula in Ano.

THE *fistula in ano* is a callous ulcer, more or less deep, situated on the side of the *anus*, and affecting the *intestinum rectum*.

This ulcer always proceeds from an abscess, which is sometimes formed in an hæmorrhoid, from some previous inflammation there; at others, and indeed

indeed more frequently, in the fat which invests the *intestinum rectum* near the *anus*; and if proper care be not taken, the *pus* will either penetrate the *rectum*, and diffuse itself there, or will push thro' the skin by the side of the *anus*. These abscesses, if opened imperfectly, will never heal; for the bottom of the ulcer being larger than the opening that should give passage to the *pus*, fresh matter will by this means be collected there, whence sinuses and callosities might be occasioned, which would afterwards appear.

DIFFERENCES. The various parts in which these abscesses are seated, the different methods by which they may be opened, the manner in which the *pus* discharges itself, supposing it makes a passage for itself, are the circumstances which create a difference between one *fistula* and another.

WHEN part of the *pus* passes through an opening into the *rectum*, and the rest through one or more orifices in the skin on the side of the *anus*, we term it a complete *fistula*: if the matter passes through a single opening only, we call it an imperfect or blind *fistula*: blind and internal, if the opening be into the *intestinum rectum*: blind and external, if through the skin by the side of the *anus*.

THE number of sinuses to which the *fistula* may lead, forms likewise other differences between them; some having many sinuses, others but one, and some none at all. The cause of these sinuses is, that the opening of the *fistula* will sometimes close several days before the bottom is healed; by which the matter, being pent up, works itself one or more cavities or sinuosities in the fat, till the opening that was closed breaks out again, to make way for its discharge. The sides of these

sinuses

finuses grow hard in time, and become callous, when they change their former name for that of *fiſtulous ſinuſes*. This is what generally happens in old *fiſtulæ*; and hence authors have derived yet other differences from their age.

Causes. I have before obſerved, that all *fiſtulæ in ano* owe their beginning to an abſceſs. The particular cauſe of this abſceſs may be accounted for, from the ſtructure, ſituation, and uſes of the part.

The *inteſtinum rectum* is ſurrounded with fat, provided there by nature, to allow for its giving way to the bulk of the excrements to paſs through it; and the more of this adipous ſubſtance there is, the more ſubject will the part be to inflammations, and abſceſſes, which may afterwards degenerate into *fiſtulæ*.

The fluids that return from this fat and from the ſubſtance of the inteſtine, in order to be reconveyed to the heart, muſt aſcend in oppoſition to their own weight: and they do this with the more difficulty, as the hard excrements which often fill the gut have almoſt the ſame effect upon it by a compreſſure, as a ligature would have, if made on its ſuperior part. This difficulty in the circulation may cauſe an obſtruction, an inflammation, an abſceſs, and, in conſequence thereof, a *fiſtula*.

This difficulty in the circulation is what produces the piles, which are only veins become varicous. Now if a large pile is irritated, either by the paſſage of hard excrements through the *rectum*, or by any other cauſe, it inflames and may impoſthumate; and no wonder if it ſhould afterwards degenerate into a *fiſtula*.

To

To conclude, the *rectum*, we know, is the paſſage for the groſs excrements, which deſcend from the *colon* to be diſcharged at the *anus*. Now theſe excrements, in paſſing out, not only drive back the fluids, but ſometimes bring along with them ſome hard ſubſtances, as the bones of fiſh, or other ſmall bones, which prick the *rectum* and inflame it, or even penetrate as they paſs quite into the fat that covers it. Thus we ſee there are many cauſes capable of producing ſuch an abſceſs as may degenerate into a *fiſtula*.

SIGNS. We may diſcover a *fiſtula* by the ſight and touch, and even diſtinguiſh one ſpecies of it from another.

IF we ſee a ſmall orifice on the ſide of the *anus* ſurrounded with calloſities, and a conſiderable diſcharge of *pus* iſſuing from it, we conclude it to be a *fiſtula*, which probably affects the *rectum*; and if a thin excrementitious matter diſcharges at the orifice, or the patient informs us that he has ſometimes obſerved ſuch a diſcharge, there is no room to doubt of the gut's being perforated; and it is then termed a complete *fiſtula*. But to be thoroughly informed, we introduce a blunt-pointed probe pretty high up into the *fiſtula*, and paſſing a finger up the *rectum*, we feel the probe with the finger.

IF the fiſtulous orifice is external, and the matter that comes from it is free from any excrementitious ſmell, or appearance, we judge it to be a blind, external *fiſtula*; but by introducing a probe into it, we may come to a certainty. If the probe paſſes no farther than the fat, it is probable the gut may not be affected; but if it ſtops at the gut, which is eaſily known by the finger being thruſt up the *anus*, whereby you plainly diſtinguiſh

 the

the probe through the ſubſtance of the inteſtine, we may conclude the *rectum* to be bare, the *pus* having deſtroyed the fat that covered it on that ſide. In examining the *fiſtula*, if the ſurgeon makes uſe of a ſtraight, fine probe, he may happen to be deceived by the obliquity of the ſinuſes; it would be proper therefore to take one that is a little curved, whoſe end is very blunt and large; and introduce it, by gently paſſing it in without giving it any particular direction; for, as it is blunt, it cannot make any new paſſages, but will follow thoſe which are already formed.

IF the excrements are diſcharged with *pus* upon their ſurface, or the ſame has been obſerved to come away, either before or after the excluſion of the *fæces*, we have reaſon to ſuppoſe it a blind, internal *fiſtula*; and if, by preſſing the finger on the fat near the ſide of the *anus*, we feel a hardneſs there, attended with pain, or the patient informs us he has been ſometimes ſenſible of a pain in that part, we may depend upon this to be the caſe.

PROGNOSTIC. Having fully diſcovered the nature of the *fiſtula*, it is no difficult matter to make a right prognoſtic. Whilſt it is ſimple, and extends no higher than the ſurgeon can introduce his finger, it may be cured by an operation; but I would never adviſe making an inciſion beyond the reach of the finger, becauſe of the hæmorrhage, which might prove very difficult to be ſtopt. If the *fiſtula* is attended with an opening in the neck of the bladder, or with a *caries* in the *os ſacrum*, or the *coccyx*, as I have ſometimes known, the diſeaſe is then very hard to be removed, and is frequently incurable.

I HAVE already obſerved, that every *fiſtula in ano* proceeds from an abſceſs, the matter of which

which procures itſelf a paſſage, either into the inteſtine itſelf, which it perforates; or on the ſides of the *anus* by an opening through the ſkin. Theſe abſceſſes are of three ſorts; large, of a middle ſize, or ſmall.

Large gangrenous Abſceſſes.

UNDER this denomination are ranged thoſe large abſceſſes, which being formed in two or three days, threaten the *rectum* and the neighbouring parts with a gangrene.

A VIOLENT pain, with a conſiderable tenſion, an acute fever, and all the other ſymptoms which attend the ſuppuration of large abſceſſes in general, are common to theſe; to which may be added, a difficulty of making water, or even a ſuppreſſion of it; which are uſual ſymptoms in theſe caſes, becauſe the neck of the bladder and the *urethra* are in the number of the parts inflamed and diſtended by the gangrenous humour. It is to little purpoſe to endeavour at ſtopping the progreſs of this diſeaſe at the beginning, by the help of diet, repeated bleedings, or the application of emollient and reſolvent topics: it is very ſeldom theſe will ſucceed; and all that can be hoped from theſe applications, is to prevent in ſome meaſure the largeneſs of the abſceſs.

IT is in general cuſtomary not to open abſceſſes till the *pus* is formed, but in this caſe that rule is not to be obſerved. Theſe abſceſſes ſhould be opened before the ſuppuration is quite completed, without waiting till the matter comes forward near the ſkin; ſince this cannot be done without its ſpreading proportionably over the neighbouring parts. The proper time therefore

to make the opening, is when the tumor is red, œdematous, and retains the impreſſion of the finger. We may then be certain that ſome *pus* is formed, which is generally very ſerous and of an ill ſmell. Every hour the inciſion is delayed after this, the matter increaſes in quantity, by the diſſolution of the fat and the cellular membrane. I have ſeen inſtances where the *rectum* has been denuded, and ſodden, as it were, in the *pus*, which had ſtript it all round; and the neck of the bladder has ſometimes ſuffered in the ſame manner for want of having had timely recourſe to the operation.

In order to perform this operation, the patient muſt lie at the edge of the bed, upon the ſide affected, with his knees bent, and held by an aſſiſtant: I then paſs the knife or lancet into the tumor, on the ſide of the *anus*, till it reaches the *pus*, and I make an inciſion ſufficiently large, being directed as to the length of the outward opening by the extent of the œdematous ſwelling. This done, I introduce the forefinger of my left hand, either to break the membranous bridles that remain (for the *pus* does not deſtroy them all) or to guide the ſciſſars to ſuch of them as cannot be ſeparated by the finger. Upon opening theſe large abſceſſes, we frequently diſcover ſinuſes which run a great way up along the *rectum* and towards the bladder, into the cellular ſubſtance that inveſts theſe parts. Theſe ſinuſes, one would imagine, ſhould render the diſeaſe incurable, as they penetrate deeper than the finger can reach; but we find by experience, that they almoſt always fill up within the firſt ſix days; or, to ſpeak more properly, the fleſh cloſes again, having only been ſeparated by the *pus*, and not deſtroyed. But ſup-

ſuppoſing the opening them was practicable, it would occaſion a great loſs of ſubſtance; and for this reaſon, as well as the preceding, they ought not to be meddled with, but, after having divided all the membranous bridles, we ſhould content ourſelves with making the outward opening ſufficiently large, and take off part of the lips to make the application of the dreſſings more eaſy. After ſome days, that is, as ſoon as the fleſh is cloſed as much as nature will admit, if any *ſinus* remains, we may lay it open to the wound by an inciſion, provided the bottom is within the reach of our finger.

Upon opening this ſort of abſceſs, we always diſcover the *rectum* bare, that is, the *pus* fluctuates againſt its external membrane: this is owing to the diſſolution of the fat; and as there is moſt of this adipous ſubſtance on the ſides of the gut, it is there we generally find it denuded. The inteſtine may be bare, either on one ſide only or both, without its being ſo anteriorly towards the *urethra*, or poſteriorly towards the *os ſacrum*; and it may likewiſe be denuded all round. If it happens only on one ſide of the gut, the denuded part muſt be cut out, otherwiſe the wound will certainly become fiſtulous. If only a ſimple inciſion was to be made through it, the divided parts would hang floating in the wound, and render it very difficult to apply the dreſſings, and perhaps occaſion a *fiſtula*. If the inteſtine is bare on both ſides, we ought, in order to preſerve it, to make a counter-opening in the other buttock, near the verge of the *anus*, of a ſufficient length to let the dreſſings be eaſily applied; and then wait to ſee what nature will do. If the inteſtine is bare all round,

 but

but no higher up than the *levatores ani* extend, the denuded part muſt be entirely extirpated.

THIS large wound is to be dreſſed at firſt like other wounds; but when the fleſh begins to cloſe, it requires a more particular care, without which the *anus* would become ſo ſtrait as not to ſuffer the excrements, if they were at all hard or large, to paſs. To prevent this inconvenience, we muſt introduce into the *rectum*, a ſmooth linen tent of a ſufficient length and bigneſs to keep open the paſſage; and at the concluſion of the cure, ſupply the place of the tent with an ivory ſuppoſitory made hollow like a *canula*, taking care to ſecure it from coming out, with a proper bandage. It will be neceſſary to continue the uſe of this ſuppoſitory almoſt a year after the wound is healed, as the cicatrix would otherwiſe contract the *anus*.

Of middle-ſized or ſmall Abſceſſes.

WE proceed now to ſmall abſceſſes, which ſometimes degenerate into *fiſtulæ*. Some of theſe, as was before obſerved, ariſe from a pile, the middle of which inflames and ſuppurates. Of theſe abſceſſes, ſome open into the inteſtine, and have only one *ſinus*, which, extending itſelf between the coats of the gut, penetrates more or leſs upwards; others have no *ſinus* at all.

THE cure of theſe abſceſſes is eaſily accompliſhed, the whole of the operation conſiſting in making an inciſion into the pile: if there is a *ſinus* which runs between the coats of the *rectum*, it muſt be opened its whole length; and this likewiſe is eaſily cured by ſimple dreſſings.

There are alſo other abſceſſes formed in an hæmorrhoid, which pierce the external coat of the inteſtine. In this caſe, the matter works itſelf ſinuſes in the adjacent fat till it makes its way out through the ſkin. Theſe may be ranged amongſt the blind, external *fiſtulæ*.

I took notice before, that the abſceſſes formed in the fat inveſting the *rectum*, are either of a middle ſize, or ſmall. Thoſe which may be termed of a middle ſize are yet ſufficiently painful to induce ſuch as ſuffer from them to apply for help. If, upon dilating theſe abſceſſes, the gut does not appear denuded, all we have to do is, to continue the inciſion the whole length of the abſceſs, in order to allow the dreſſings to be properly applied. But, if the *pus* has left the inteſtine bare, theſe abſceſſes muſt not only be opened their whole length, but the part of the inteſtine which is denuded muſt be cut away, performing the operation in the ſame manner as we ſhall hereafter direct for a blind *fiſtula*. It is proper to obſerve, that though the gut be bare only in one particular part, yet that is ſufficient to render the wound fiſtulous, and therefore it is incumbent upon the ſurgeon to examine well into this. If theſe abſceſſes are opened imperfectly, or if they open either of themſelves, or by the help of maturative plaſters, a *fiſtula* will neceſſarily be the conſequence: an internal, blind *fiſtula*, if the abſceſs penetrates into the inteſtine; an external, blind *fiſtula*, if it makes its way through the ſkin on the ſide of the *anus*; and a complete *fiſtula*, if the matter paſſes both ways, as frequently happens.

The very ſmall abſceſſes are ſo little painful, that moſt patients take the ſlight twinges they feel from them, for the effects of the piles: the

abſceſs breaks, and they think themſelves cured; but in a ſhort time after, they find they have either a blind or a complete *fiſtula*, according as where the matter breaks through.

CURE. I have known *fiſtulæ* cured by the uſe of cauſtics, with which all the calloſities were deſtroyed; but this method is ſo unſafe, ſo tedious, and, for a conſiderable time, ſo uncertain, that it bears no compariſon with the chirurgical operation, and therefore I would never adviſe it.

THE operation conſiſts in two things; firſt, to make the entrance of the *fiſtula* conſiderably larger than the bottom; ſecondly, to extirpate all the calloſities, or at leaſt to put them in a way to be diſſolved by ſuppuration.

IF it be a blind *fiſtula*, we muſt begin by making it a complete one: that is, if the opening is in the *rectum*, we muſt make an orifice through the ſkin; if it is outwards, we muſt do the ſame in the *rectum*.

WE will ſuppoſe it to be in the *rectum*. In this caſe, authors propoſe to introduce the finger into the *anus*, and by the help of that, to convey a ſharp-pointed probe, through the fiſtulous opening, into the cavity of the abſceſs, and bring it out through the external ſkin; by which means the probe itſelf will make the neceſſary opening on the outſide. This is very plauſible, but hardly ever practicable; for which reaſon I ſhould prefer the following method.

HAVING lubricated my forefinger with oil or pomatum, I introduce it into the *rectum*, as high as the calloſity reaches, and preſs the end of the finger upon this calloſity. I then paſs a lancet or biſtory through the ſkin to the center of the calloſity, the finger that remains in the *rectum* ſerving

ing as a guide; and, in drawing out the inſtrument, I enlarge the external opening, and thus the *fiſtula* becomes a complete one.

After this, I convey a hollow, blunt-pointed probe between the calloſities, and ſearch for the paſſage that leads to the opening in the inteſtine. Whether I diſcover it with this or not, directing it to be held by an aſſiſtant, I run a ſharp-pointed probe along its groove, and then withdraw the former. The hollow probe may be looked upon, perhaps, as uſeleſs, and tending rather to prolong the operation; but, on the contrary, we ſhall find it of great ſervice. If we were to introduce the ſharp-pointed probe at firſt, the point might ſtick in the fleſh, and prevent us from conveying it to the bottom of the *fiſtula*; whereas the blunt probe goes on in the right direction, and will not be liable to make any new paſſage. The ſharp-pointed probe being introduced, I do not offer to paſs it through the fiſtulous opening that is in the *rectum*, as by that means I might leave ſome calloſities above it, which might hinder the wound from healing; but I perforate the *rectum* above the calloſities, which by my finger I had diſcovered there, and with the ſame finger bring out the end of the probe with which I perforated the inteſtine; ſo that the probe will make a ſort of loop including all or the greateſt part of the calloſity, which we are to extirpate intirely with a biſtory. This done, I introduce my fore-finger into the wound, and if I meet with any membranous bridles, I divide them with the ſciſſars; if there are any ſinuoſities, I dilate them; if any calloſities left behind after the firſt inciſion, I either extirpate them, or make ſeveral ſcarifications into them with the biſtory, in order to bring them to ſuppuration. To conclude, we

we are to manage ſo, that the bottom of the wound is laid quite open, and makes, in a manner, but one and the ſame cavity with the remaining part of the inteſtine. If the outward opening proves too ſmall, in proportion to the bottom of the wound, to allow of dreſſing it conveniently, and without pain, I enlarge it by an inciſion directed towards the buttock, and cut off the angles at the circumference of the wound.

Previous to every inciſion that is made, either with the knife or ſciſſars, at the bottom of the wound, we ſhould examine with the finger, whether we can feel the pulſation of any conſiderable branch of an artery, in order that we may avoid dividing it: if any one ſhould be opened, it will occaſion a conſiderable hæmorrhage, which muſt be ſtopt as ſoon as poſſible. It is frequently very difficult to diſcover whence the hæmorrhage ariſes, and, unleſs we can ſee the orifice of the veſſel, there is but one way to diſtinguiſh where it is, and that is, by preſſing the finger upon ſeveral parts of the wound, and when the blood ceaſes to flow, it is a ſign the finger is upon it.

Though ſeveral methods have been propoſed to ſtop the hæmorrhage upon this occaſion, yet, for my own part, I know but one which can be relied on, and that is, if the veſſels be conſiderably large, to apply a ſmall compreſs, dipt in ſome ſtrong ſtyptic water, upon the opening, and to have it kept there a few minutes with the finger, to give time to the ſtyptic to form an eſchar. This done, we are to keep on the compreſs with ſome more lint and the reſt of the dreſſings. If, to ſpare ourſelves the trouble of holding on the compreſs, we only ſupport it at firſt with doſſils, what is done to ſecure it often ſerves rather to diſplace

displace it; and the blood that extravasates gets up into the *rectum*, and collects there, as may be known by the noise which the patient perceives in his belly, likewise by the lowness of his pulse, and faintings: in this case the dressings must be all taken off, and the hæmorrhage stopt in the manner above directed.

The wound requires nothing afterwards more than any other simple wound, except in the manner of applying the first tent or dossil. If either of these be introduced into the bottom of the wound, without proper care, there will be danger of hurting the intestine at the part that has been cut, or perhaps of making a new passage between the gut and the fat; which would hinder the wound from healing. It must be applied therefore with care; and, in order to do it properly, we must put the fore-finger of one hand into the *rectum*, somewhat higher than the wound, in such a manner as to cover it, and afterwards introduce the tent or dossil between this finger and the sound part of the intestine. Upon drawing away the finger, the head of the tent will be in the wound, whilst the other extremity will reach into the gut itself, above the wound. The same care must be taken at every dressing, and upon drawing out the tent at these times, we may know it was well placed, if the end of it is tinged with excrement.

The tent being rightly applied, the rest of the wound is easy to dress.

The operation in a blind, external *fistula* has this difference only, in the introduction of the probe: in an internal, blind *fistula*, we must begin by thrusting the finger up the *rectum*; in the external, by introducing the probe first, because the bulk of the finger passed through the *anus* into

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the inteſtine, is liable to change the direction of the fiſtulous *ſinus*, and thereby to render the introduction of the hollow probe ſomewhat difficult; but the probe being once introduced, the reſt of the operation is performed in the ſame manner as was before directed.

The like method is alſo to be obſerved in a complete *fiſtula*.

The patient cannot be enjoined too ſpare a regimen; for each time he goes to ſtool the dreſſings muſt be renewed; and we ſhould further endeavour, by the choice of his diet, to prevent a looſeneſs, which might otherwiſe enſue.

Men are ſometimes troubled with a retention of urine after the operation, which may be owing to the *urethra* being compreſſed by the lint; or it may proceed from a ſlight inflammation extending from the wound to the neck of the bladder. Bleeding once or twice abates the inflammation, and, till it is quite removed, the patient ſhould admit the *catheter*, by which means a free courſe is given to the urine that is in the bladder. Sometimes putting the patient upon his knees, is ſufficient to facilitate the paſſing of his urine without probing him.

The ſubſequent dreſſings differ nothing from the general rule, and therefore it is needleſs to give any further account of them.

Of

Of the HÆMORRHOIDS.

THE hæmorrhoids are certain excreſcences ariſing about the verge of the *anus*, or the inferior part of the *inteſtinum rectum*.

THE *rectum*, as well as the *colon*, is compoſed of ſeveral muſcular membranes, connected to each other by an intervening cellular ſubſtance; and as the muſcular fibres of this inteſtine always tend, by their contraction, to leſſen its cavity, the internal membrane, which is very lax, forms itſelf into ſeveral *rugæ*, or folds. In this conſtruction nature reſpects the uſe of the part, which occaſionally gives paſſage to, or allows the retention of, the excrements; the hardneſs and bulk of which might produce conſiderable lacerations, if this inteſtine was not capable of dilatation. The arteries and veins ſubſervient to this part are called hæmorrhoidal, and the blood that returns from hence is carried to the meſeraic veins.

THE *inteſtinum rectum* is particularly ſubject to the hæmorrhoids, from its ſituation, ſtructure, and uſe; for whilſt the courſe of the blood is aſſiſted in almoſt all the other veins of the body by the diſtention of the adjacent muſcles, and the preſſure of the neighbouring parts, the blood in the hæmorrhoidal veins, which is to aſcend againſt the natural tendency of its own weight, is not only deſtitute of theſe aſſiſtances, but is impeded in its paſſage: for, firſt, the large excrements which lodge in this inteſtine dilate its ſides, and the different reſiſtances which they form there, are ſo many impediments obſtructing the return of the blood; not in the large veins, for they are placed

placed along the external ſurface of the inteſtine, but in all the capillaries which enter into its compoſition. Secondly, as often as theſe large excrements, protruded by others, approach near the *anus*, their ſucceſſive preſſure upon the internal coats of the inteſtine, which they dilate, drives back the blood in the veins, and for ſo long ſuſpends its courſe: the neceſſary conſequence of which is, a diſtention of the veins in proportion to the quantity of blood that fills them. Thirdly, in every effort we make, either in going to ſtool, or upon any other occaſion, the contraction of the abdominal muſcles, and the diaphragm preſſing the contents of the *abdomen* downwards, and theſe preſſing upon the parts contained in the *pelvis*, another obſtruction is thereby oppoſed to the return of the blood; not only in the large veins, but alſo in the capillaries, which being of too weak a texture to reſiſt the impulſe of blood, that always tends to dilate them, may thereby become varicous.

The dilatation of all theſe veſſels is the primary cauſe of the hæmorrhoids; for the internal coat of the inteſtine, and the cellular membrane which connects that to the muſcular coat, are enlarged in proportion to the diſtenſion of the veſſels of which they are compoſed. This diſtenſion, not being equal in every part, produces ſeparate tumors in the gut, or at the verge of the *anus*, which encreaſes according as the venal blood is obſtructed in them, or circulates there more ſlowly.

Whatever, then, is capable of retarding the courſe of the blood in the hæmorrhoidal veins, may occaſion this diſeaſe. Thus perſons that are generally coſtive, who are accuſtomed to ſit long

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at ſtool, and ſtrain hard; pregnant women, or ſuch as have had difficult labours; and likewiſe perſons who have an obſtruction in their liver, are for the moſt part afflicted with the piles: I ſay, for the moſt part; for, though every body has the hæmorrhoidal veſſels, every body, however, has not the hæmorrhoids; the different cauſes, which I have before mentioned, being not common to all, or at leaſt not having in all the ſame effects.

When the hæmorrhoids are once formed, they ſeldom diſappear intirely; and we may judge of thoſe within the *rectum* by thoſe which, being at the verge of the *anus*, are plainly to be ſeen. A ſmal pile, that has been painful for ſome days, may ceaſe to be ſo, and dry up; but the ſkin does not afterwards retain its former firmneſs, being more lax and wrinkled, like the empty ſkin of a grape. If this external pile ſwells, and ſinks again ſeveral times, we may perceive, after each return, the remains of the pile, though ſhrivelled and decayed, yet ſtill left larger than before. The caſe is the ſame with thoſe that are ſituated within the *rectum:* they may happen indeed never to return again, if the cauſe that produced them is removed; but it is probable that the excrements may in their paſſage occaſion a return of the ſwelling, to which the external ones are leſs liable; for the internal piles make a ſort of knots or tumors in the inteſtine, which ſtraightening the paſſage, the excrements, in paſſing out, occaſion irritations there, that are more or leſs painful in proportion to the efforts which the perſon makes in going to ſtool; and it is thus theſe tumors become gradually larger.

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The hæmorrhoids are ſubject to many variations; they may grow inflamed from the irritations beforementioned, to which they are expoſed; and this inflammation cannot always be removed by art.

In ſome, the inflammation terminates in an abſceſs, which ariſes in the middle of the tumor, and degenerates into a *fiſtula*, if not prevented by the means already directed in treating of the cure of *fiſtulæ*. Theſe piles are very painful till the abſceſs is formed.

In others, the inflammation terminates by an induration of the hæmorrhoid, which remains in a manner ſchirrous. Theſe never leſſen, but muſt neceſſarily grow larger. This *ſchirrus* ſometimes ulcerates, and continually diſcharges a *ſanies*, which the patient perceives by ſtains on his ſhirt, and by its occaſioning a very troubleſome itching about the verge of the *anus*. Theſe kind of hæmorrhoids ſometimes turn cancerous.

There are ſome hæmorrhoids, and thoſe of different ſizes, which are covered with ſo fine a ſkin as frequently to admit blood to paſs through. This fine ſkin is only the internal coat of the *rectum*, greatly attenuated by the varicous diſtenſion of its veſſels; and the hæmorrhage may proceed from two cauſes; namely, either from an excoriation produced by the hardneſs of the excrements, or from the rupture of the tumefied veſſels, which break by their too great diſtenſion.

In ſome of theſe the patient voids blood almoſt every time he goes to ſtool; in others, not ſo conſtantly. We ſometimes meet with men who have a periodical bleeding by the piles, not unlike the *menſes* in women; and as this evacuation, if moderate, does not weaken the conſtitution,

we may infer that it ſupplies ſome other evacuation, which nature either ceaſes to carry on, or does not furniſh in due quantity; and hence alſo we may explain, why the ſuppreſſion of this diſcharge, to which nature had been accuſtomed, is frequently attended with dangerous diſeaſes.

THE hæmorrhoids are ſometimes diſtended to that degree as to fill the *rectum*; ſo that if the excrements are at all hard, they cannot paſs. In this caſe the excrements force the hæmorrhoids out of the *anus*, to procure a free paſſage, conſequently the internal coat of the *rectum*, to which they are connected, yields to extenſion; and upon examining theſe patients immediately after their having been at ſtool, we ſhall find part of the internal coat of that gut forms a ſort of ligature or ſtricture round the hæmorrhoids. A difficulty will occur in the return of theſe in proportion to their ſize, and as the verge of the *anus* is more or leſs contracted. If the bleeding piles come out in the ſame manner upon going to ſtool, it is then they void moſt blood, becauſe the verge of the *anus* forms a kind of ligature above them.

I HAVE already taken notice that the hæmorrhoids vary according to their different nature, whence proceed diſeaſes which reſemble each other only in name; for this reaſon we cannot treat properly of their cure, without mentioning the ſeveral kinds of them in their order. I will begin with thoſe that are at the verge of the *anus*, and are recent.

THESE piles form either one or more little red knots or tumors, which are hard, painful, and ſubject to itch. The pain is leſs violent,

if the tumor is quite external, than if encloſed and compreſſed by the verge of the *anus*.

In this caſe there are three indications to be anſwered. Firſt, to evacuate by bleeding, ſince every pile always implies, if not a *plethora*, an obſtruction of the hæmorrhoidal veſſels, where the blood finds it difficult to aſcend in oppoſition to the natural tendency of its own weight. Secondly to empty the inteſtines (where probably ſome hard excrements being retained, may occaſion the compreſſions before-mentioned) with cooling laxatives, ſuch as *caſſia* infuſed in whey, and given either as a draught or clyſter. Thirdly, to abate the inflammation, by emollient cataplaſms and other ſoftening applications, as *pomatum*. Sitting over hot ſteams is likewiſe a very efficacious remedy.

The hæmorrhoids, at their firſt appearance, may generally be cured by theſe means, but the veſſels, as was before obſerved, remain varicous, and larger than they are in a natural ſtate; and if, by a frequent return of the inflammation, this pile at laſt becomes ſchirrous, the patient will never recover, unleſs it is extirpated. If a ſmall abſceſs is forced here, it muſt be properly opened, or it will leave a *fiſtula*. If it become turgid with blood, ſo as to form a black-coloured bladder like a grape, it muſt be opened with a lancet to let out the blood that is there obſtructed. This ſlight evacuation generally unloads the neighbouring veſſels, and for a time puts an end to the diſtemper. Nature points out this remedy by the burſting of this bladder ſometimes ſpontaneouſly, and thereby intirely diſcharging its contents.

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I PROCEED now to ſpeak of thoſe hæmorrhoids that are ſituated within the *rectum*. Theſe are ſeldom felt whilſt they continue ſmall, and one may have them a long time without being ſenſible of them: but when, by growing larger, they begin to ſtraiten the paſſage of the excrements, the leaſt inflammation cauſes a heat and pain there; not very violent indeed, but very diſagreeable by its continuance, from the preſſure of the excrements. This pain increaſes upon the patient's going to ſtool, when a certain quantity of hard excrements force their way through ſucceſſively, and by the irritations thereby occaſioned, the hæmorrhoids grow ſtill larger, and then admit of other varications.

THOSE which void much blood, by a repeated diſcharge, whenever the patient goes to ſtool, or by a periodical evacuation, to which nature is accuſtomed, may be looked on as beneficial; and daily experience verifies that aphoriſm of *Hippocrates*, which forbids the doing any thing to ſuppreſs this diſcharge; for we find that ſuch perſons as have been ſubject to it, if it diſappears (from whatever cauſe that happens) are ſoon after ſeized with ſome diſtemper. If therefore it ceaſes, we muſt ſupply the want of it by ſome other evacuation: for which purpoſe, ſome propoſe bleeding in the arm or foot, and this has often proved uſeful; but I have known the application of leeches to the verge of the *anus* more effectual. In ſhort, this laſt method ſupplies the defect by the evacuation of thoſe individual veſſels of which nature had made choice. It is true, three or four leeches do not draw away much blood; but after they are fallen off, the patient ſhould be put upon a cloſe-ſtool, with warm water in it, and the orifices

made by the leeches, will bleed as long as he continues in that ſituation; and thus you may take away twelve ounces of blood in an hour's time.

THIS daily or periodical evacuation, however, ceaſes to be beneficial when it becomes violent, as it is liable to weaken the patient; and hence ſome have fallen into a *maraſmus*, have been ſeized with a looſeneſs, or have become dropſical.

IN this caſe, bleeding in the arm may prove very ſerviceable, in the ſame manner as it ſuſpends or ſtops the flooding in women.

TO this muſt be added the uſe of an incraſſant diet, and ſuch remedies as may prevent that great poverty and diſſolution of the blood, which is the conſequence of this exceſſive evacuation.

AS to ſlight diſcharges of blood, proceeding from the accidental excoriations of the hæmorrhoids by the excrements; as they are not uſeful to nature, they may be ſuppreſſed without danger.

THE blind hæmorrhoids, or thoſe which do not bleed, require the more attention, as they daily grow larger for the reaſons before-mentioned, and gradually diſtending the internal coat of the *rectum*, will at laſt appear externally. Theſe cauſes of their growth direct us in their method of cure, it being certain, that by the removal of theſe different cauſes, the piles will leſſen, and at length diſappear. This may be done by bleeding, a proper regimen, and ſuitable topics. By bleeding, in proportion to the ſtrength and conſtitution of the patient, the maſs of blood will be diminiſhed, and as the general plentitude is abated, the hæmorrhoidal veſſels will become leſs full, and their obſtruction may be thereby removed. It is eaſy to prevent the too hard excrements from compreſſing

preſſing the coats of the *rectum*, and from irritating the piles, that are formed there, in their paſſage. For this end it is ſufficient either now and then to give ſome gentle laxative, as pulp of *caſſia*, or by clyſters to ſoften and thin thoſe excrements, which are too hard to paſs without making the patient ſtrain. Hogs lard only, being melted and injected into the *anus* through a ſmall ſyringe juſt before going to bed, will moiſten and ſoften the excrements ſo as they may be excluded in the morning without pain. I have often known patients relieved in ſuch a manner by theſe precautions continued for ſeveral months, that they looked upon themſelves as cured; for which reaſon I cannot too much recommend the uſe of them.

An exact regimen is likewiſe very eſſential. I have ſeen piles ſo much ſwelled as not to admit any paſſage through the *anus*. In theſe caſes, I have kept the patient in bed for ſix or ſeven days, to prevent the excrements by their weight from falling down upon theſe piles; and made them live only upon a little broth, that they might form but a ſmall quantity of excrement. By theſe means, I have known the hæmorrhoids cured for a long time without any return: nor will this appear ſurpriſing, if we reflect that the irritation occaſioned by one ſingle ſtool, which the patient may chance to have in twenty-four hours, does more miſchief in this caſe than the application of the beſt topics can do good between one ſtool and another.

If, for want of theſe precautions, the piles at laſt puſh out upon going to ſtool, they generally continue to do ſo every time the patient has occaſion; and at length being very much ſwelled and di-

diſtended, it is with no ſmall difficulty they are put up again: nay, it has ſometimes happened that it being abſolutely impoſſible to make them re-enter, a gangrene has ſupervened, by the verge of the *anus* forming a kind of ligature above them.

WHEN, therefore, they are accuſtomed to appear externally, the patient can never be cured. unleſs they are extirpated either by ligature or inciſion.

THE ſhape of the hæmorrhoid ought to determine us which of theſe two methods to chuſe. In ſome, the *baſis* is much narrower than the ſuperior part; others hang like a pear, by a ſort of ſtalk formed of the veſſels which produce them. In both theſe caſes the ligature is preferable, as this method occaſions no hæmorrhage, and when the ligature falls off, the patient finds himſelf cured with hardly any mark of a wound remaining: but if the *baſis* of the pile is large, I rather chuſe the knife. We might indeed uſe the ligature here, and I have frequently known it done, but there are two reaſons which induce me to prefer inciſion. Firſt, the terrible and almoſt intolerable pain cauſed by the ligature for five or ſix hours. Secondly, the varicous ſwelling that remains in the internal coat of the gut and the cellular ſubſtance where the pile was attached, which ſwelling, when we uſe inciſion, goes off by the ſucceeding ſuppuration.

IF the piles never appear externally, unleſs when the patient goes to ſtool, we muſt either take that opportunity to perform the operation, or give him a clyſter to promote a ſtool and make them come out. Suppoſing the patient to have been prepared by bleeding, and a proper regimen for ſome days, if the piles are on both ſides, I place the patient

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on the bed-ſide, lying on his belly, with his feet on the floor. If they are on one ſide only, he muſt lie on the ſide affected. The buttocks being then ſeparated and held ſo by aſſiſtants, I take care to diſtinguiſh the piles from the ſtricture formed round them by the internal coat of the gut; and if there are ſeveral of them, I take hold of each with an errhine, or hook, which I direct to be held by the aſſiſtants. I afterwards take the errhines one after another, and with a ſingle ſtroke of the ſciſſars cut away the pile at its root, doing the ſame by the reſt ſucceſſively. If they were not all ſecured at firſt by the errhines or hooks before-mentioned, the pain occaſioned by cutting the firſt would cauſe a contraction of the *anus*, and the others might re-enter without giving time to lay hold of them.

They bleed more or leſs according to the ſize of the artery which ſupplies them, and the blood either flies out in a ſtream, or diſcharges from the whole *baſis* of the pile, as from a ſpunge when ſqueezed.

If the blood flies out, we muſt lay a ſmall compreſs dipt in ſtyptic water upon the artery from whence it iſſues, holding it on with the finger an hour or two, and not apply the other dreſſings till afterwards; nor muſt this ſmall compreſs be then removed, but ſhould be kept upon the artery with doſſils of lint, compreſſes, and the T bandage.

It is equally neceſſary to ſtop the hæmorrhage, if the blood diſcharges in the other manner; for which purpoſe, if we have cut ſeveral piles, we muſt put a large doſſil of lint, tied with a thread, between the wounds, and introduce it into the *anus*, with as much as poſſible to the internal coat of

of the inteſtine that formed the ſtricture. This ſtricture will ſometimes go in again at once; at others, will require ſome days before it is quite returned. When the piles are out, and cannot be returned, if they appear the leaſt black, they muſt be immediately cut, for otherwiſe both them and the ſtricture would ſoon become gangrenous, becauſe of the ſtrangulation cauſed by the verge of the *anus* above them. The operation is to be performed in the manner as before directed.

The dreſſings for the inciſions are the ſame as for other ſimple wounds. Every time the patient gos to ſtool, or once in four and twenty hours, we muſt introduce into the *anus* a freſh doſſil of lint, armed with a digeſtive to bring off the ſloughs. When this purpoſe is anſwered, which may be known upon the patient's going to ſtool, it will be ſufficient afterwards to throw up ſome vulnerary and deterſive injections, and in a few days the wounds will cicatrize.

It would be proper for the patient during this time, and even for ſome days after his cure, to be cautious as to his diet; and to continue the uſe of clyſters, that, by preventing a diſtenſion of the parts, the cicatrix may ſtrengthen and confirm the cure.

Of

Of the STONE, and of the Diseases thereby occasioned.

PETRIFACTIONS are so common in the productions of nature, that we need not wonder they occur sometimes in the human body. We have had frequent instances of infants who have been almost intirely petrified in the mother's womb; and in the year 1625, a child was born at *Pont au Mousson* who had one shoulder petrified, and some of its *viscera* turned into a kind of gravelly substance. When these petrifactions become thus in a manner general, they obstruct the motions both of the solids and fluids, in proportion as they are formed and increase; and for this reason these children have always been found dead. But the case is different as to the petrifactions formed in particular parts of the body, since if these bring on the destruction of the machine, it is by the diseases they occasion.

WE often see stones of different kinds formed in several parts of the body.

SOME are formed in the lungs; and these are generally whitish, light, and friable. I knew a person who expectorated stones of this kind, and as large as millet-seeds, for many years. See my *Observations*, p. 128.

OTHERS are formed in the gall-bladder, which is sometimes filled with several stones; and I have known it intirely filled with a single one. These stones, though formed of a bilious and bituminous substance that burns like camphire, are hard, though light, and either of a yellow, green, or brownish colour.

Some breed in the joints of gouty perſons, by the coagulation of the *ſynovia:* theſe are whitiſh and friable.

Some are formed in the *ſacculus lacrymalis*, and theſe are pretty hard.

Others are found in the glands in various parts of the body; and are of a nature analogous to the fluids which are ſeparated by theſe glands. Thus ſome are bred in the kidneys, which are ſometimes filled with them. Theſe are not always of the ſame ſolidity; being ſometimes hard, ſometimes ſoft and friable. Some are ſmooth, others rough.

Some we find which fill the *ureters*, and, from their taking exactly the figure of that canal, ſeemed to have been produced there.

We likewiſe find ſtones in the prepuce of children, who have a *phimoſis*; others in the urinary bladder, the *perinæum*, and *urethra*.

Nature, who, in the œconomy of the whole world, follows one certain courſe preſcribed by the Great Creator, may equally and by the ſame cauſes produce within our bodies, as well as in the earth, all theſe petrifactions, which conſiſt only in the peculiar diſpoſition of matter; and as there are ſome ſoils more abounding in ſtones of various kinds, to which the nature of the waters that paſs through them greatly contributes, ſo alſo there are ſome bodies more ſubject to ſtony concretions than others, which may be aſcribed to the nature of their blood.—This is the more probable, as we frequently find this diſtemper to be hereditary. I confeſs however it is not always ſo, and may ariſe in the courſe of a man's life by an abuſe of the non-naturals. And here I might examine into the various opinions that have been advanced

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about the causes of these petrifactions, or the different principles of which these stones are formed; but this point, though physical, is liable to many disputes; and therefore I shall only shew you, in a few words, in what manner they are formed in us. I put some urine into a vessel, and let it settle there: as the moisture evaporates, we find a gravelly incrustation that sticks to the sides of the vessel, and at last a kind of mortar subsides to the bottom, which, when dried, is of the same nature with the stone. The like experiment may be made with all the fluids that are secreted from the blood. This is a sufficient reason to induce us to believe, that the formation of a stone is owing to the union of the saline, sulphurous, and earthy particles; in a word, of all the solids that enter into the consistence of any liquid whatever.

What is performed in the vessel, is performed also in us, as well from the nature of our fluids, as the disposition of the parts affected.

The nature of the fluids causes the difference between one stone and another; and therefore those which are formed in the gall bladder, the lungs, kidneys, &c. being formed by different fluids, appear also evidently of a different nature. Nay more, the same sort of fluid, as the urine for instance, being altered by various circumstances, produces stones very different from each other; as we see in those in the kidneys and bladder; and undoubtedly it is from hence we find, that what dissolves one stone has no effect upon another.

But though the different principles of the fluids produce the stone, it is the disposition of the parts affected, which occasions the concretion of these principles, by allowing those fluids to flow very

 gently,

gently, or even to ſtagnate; for it is not in the veſſels theſe ſtones are formed (the fluids paſs too impetuouſly through them), but in the gall-bladder, the lungs, the kidneys, the urinary bladder, &c. cavities where the fluids ſlacken in their motion.

STONES therefore may be formed in any part where the fluids are not in motion, or where they circulate but ſlowly. As ſoon as the *nucleus* is made, the ſtone increaſes gradually by the ſupply and appoſition of freſh matter; that is, new *ſtrata* are ſucceſſively formed, as may be diſcovered by breaking ſome of the ſtones that have been extracted out of the bladder; when you may diſtinguiſh theſe *ſtrata* to be more or leſs thick, and ſometimes a little different from each other, as if formed of different principles. The number of theſe *ſtrata*, and their thickneſs, determines the ſize of theſe ſtones; and the quality of the ſlime, of which they are formed, determines their quality, hardneſs, and weight. The ſoft ſtones grow quicker than thoſe which are hard; and it is obſervable that the ſoft are almoſt always angular, whereas thoſe which are hard are generally round or oval.

WHEN there is a ſingle ſtone only, its ſurface is never very ſmooth; but if there are two, they rub againſt each other, and one ſide of each is poliſhed; but if each ſide of both ſtones is ſmooth, it is highly probable that there are more than two ſtones.

Of Stones in the gall-bladder.

THE gall-bladder is ſhaped like a pear, large at the bottom, and very ſmall towards its neck, where

where there is a kind of ſphincter. It is connected to the concave ſide of the liver, and ſerves as a reſervoir for part of the bile. This bile empties itſelf into the *duodenum*, through the cyſtic duct which unites with the neck of the gall-bladder.

The choler or bile which lodges there, frequently inſpiſſates and produces ſtones. Theſe ſtones are all bituminous, and inflammable like camphire; but as this bile is often different in different perſons (as may be eaſily ſeen by opening ſeveral gall-bladders), ſo the ſtones likewiſe that are formed there do in ſome particulars differ. Sometimes alſo we find ſo conſiderable a quantity, that the gall-bladder is almoſt full of them; and in this caſe they are always angular.

It is ſeldom that theſe ſort of ſtones occaſion any ſenſible indiſpoſition; and therefore, as long as they create no diſorder, we have no particular ſigns whereby to diſcover them. But they may, however, happen to produce complaints, and experience points out to us ſeveral which may reſult from thence: as, firſt, the ſtoppage of a ſtone that has lodged itſelf in the neck of the gall-bladder; which ſtoppage occaſions colics, attended ſometimes with dangerous conſequences, as they are ſeldom free from an inflammation. Theſe are called hepatic, but ought rather to be termed cyſtic colics. The ſecond is what has been named the dropſy of the gall-bladder, but which might more juſtly be ſtiled the retention of the bile; as the ſtoppage of the urine, when it cannot paſs out of the bladder, is called the retention of urine.

If the ſtone is lodged in the neck of the gall-bladder, its continuance there is the more painful, as it is a hollow muſcle that always inclines to contract

contract itſelf; in this caſe, it ſqueezes and preſſes upon the ſtone, which, by its hardneſs and irregular ſhape, irritates it more and more. Hence proceed violent pains between the navel and the *cartilago xiphoides*. I have known theſe pains ceaſe and return again by intervals, like thoſe a perſon feels who has a ſtone in the bladder, which ceaſe for a time, after he has made water, and return again whenever the bladder contracts itſelf to expel a few drops of urine. Hence likewiſe is produced the convulſion which affects all the neighbouring parts; alſo the acute fever, the inflammation, with numberleſs other ſymptoms that enſue, and which never ceaſe, till the ſtone changing its ſituation, either returns again into the gall-bladder, or paſſing from thence, and making its way through the cyſtic duct, falls at laſt into the *duodenum*.

These ſymptoms ſerve us as diagnoſtic ſigns, which are not however altogether certain, ſince an inflammation alone might produce them, without the intervention of a ſtone; but we have no others at the beginning of the diſtemper, and the ſame remedies are indicated in either caſe.

The only means of making the ſtone change its ſituation is by removing the inflammation, and bringing on a general relaxation of the parts affected; for which purpoſe we muſt bleed the patient frequently and largely, having a regard at the ſame time to his ſtrength, and the degree of the ſymptoms; adding oily draughts, emollient cataplaſms, and, in a word, all that is likely to abate the convulſion which produces all theſe ſymptoms; and if by this method the ſtone is at laſt brought to change its ſituation, the pain ceaſes

all

all at once, and so sudden an alteration ensues that the patient imagines himself cured.

If the stone gets again into the cavity of the gall-bladder, it is no longer felt; but the patient is liable to a return of the diseases from the same cause as before. If it has passed into the *duodenum*, we are sure to find it after some days, as it will follow the direction of that gut, and be excluded with the excrements. It is, however, very surprising that such stones as I have seen, as large as apricot stones, should be able to pass through the neck of the gall-bladder, and the cystic duct.

Sometimes the bile cannot pass out of the gall-bladder. The bile contained in the gall-bladder is designed to pass into the *duodenum*: now every thing that is capable of preventing this, whether it be part of the bile inspissated in the neck of the gall-bladder, or the cystic duct, or whether it be a stone that lodges in the neck, or in that duct; all these may produce so great a distension of the gall-bladder, that it has sometimes projected in the forepart of the epigastric region, in the same manner as the urinary bladder does, when too full, in the forepart of the *hypogastrium*. This distention of the gall-bladder may happen but slowly, and by degrees, and in that case is not attended with very bad symptoms; which has induced some practitioners to stile it a dropsy of the gall-bladder.

The only signs we have to discover this disorder, is the protuberance in the forepart of the epigastric region, and the fluctuation that may be felt under the finger. I have observed, upon a gentle pressure of the finger on this part, in order to find out the nature of the tumor, that it has suddenly disappeared. Undoubtedly what obstructed the passage

ſage of the bile, gave way immediately upon being preſſed; for we afterwards found the bile paſſed very plentifully through the inteſtinal canal, whereas before it only paſſed in a very ſmall quantity, as was evident from the colour of the excrements.

THIS diſeaſe is the more difficult to be cured, as we cannot readily diſcover what it is that prevents the paſſage of the bile out of the gall-bladder; and conſequently none but general remedies can be propoſed to remove or prevent ſymptoms, the cauſe of which is undetermined. It has been propoſed to make a puncture in the gall-bladder with the *trocar*, in order to empty it, as the puncture is made in the urinary bladder, in ſuch retentions of urine where we cannot paſs the *catheter*; but the caſe is by no means the ſame here. In the latter inſtance, the puncture is made either in the *perinæum*, or above the *os pubis*, and the *trocar* is introduced into the bladder to diſcharge it of its contents; but the bladder is attached in theſe parts by a cellular membrane, and is the firſt cavity which the *trocar* enters, after it has gone through the ſkin. The urine therefore that paſſes afterwards into the bladder through the *ureters*, cannot be diffuſed in any other cavity. The gall-bladder is differently circumſtanced, as it does not adhere to the *peritonæum*, and therefore ſuppoſing it emptied by a puncture, which is eaſily done, the opening that is made there not cloſing immediately, would ſuffer the freſh bile to paſs out, and diffuſe itſelf in the cavity of the *abdomen*. We muſt be aſſured then, in order to make this puncture ſafely, that the gall-bladder, by being inflamed, is become adherent to the *peritonæum*; which we may imagine to be the caſe, if there is an inflammation of the teguments.

WHEN

When the preternatural diſtenſion of the gall-bladder happens on a ſudden, it is attended with acute pains, a fever, and an inflammation. It may then contract an adheſion with the *peritonæum*; in which caſe that and the *peritonæum*, by their adheſion making but one, have been known to open, and afford a paſſage for ſtones or bile into the cellular membrane that connects the *peritonæum* to the muſcles: theſe extraneous ſubſtances, exciting an inflammation in the parts where they lodge, produce a *phlegmon* that terminates in an abſceſs; and, upon opening it, we diſcover bilious ſtones, and frequently a cavity which communicates with the gall-bladder, and through which the gall paſſes.

These are to be dreſſed like other abſceſſes; but there is great room to apprehend they will end in a *fiſtula*, and this for two reaſons; firſt, the difficulty of applying proper remedies to the opening in the gall-bladder, and procuring its reunion. Secondly, this cavity being generally complicated with ſinuſes that are frequently difficult to diſcover, the bile concretes there, and produces other ſmall ſtones, which cannot be perceived till grown larger.

Of Stones in the Lungs.

The formation of ſtones in the lungs is not a common diſeaſe, but I have known two inſtances of perſons who often diſcharged them by expectoration. Theſe ſtones were undoubtedly formed by the inſpiſſation of the lymph that is continually ſecreted by the glands of the lungs, and which, inſtead of being expectorated, thickened in ſome

of the *bronchi*, and concreted. The ſtones in the two inſtances beforementioned, were of an irregular figure, and, pricking the membranes by their aſperities, cauſed violent coughs. They were expectorated at laſt by coughing; but in paſſing the *bronchi* in their way to the *larynx*, they occaſioned excoriations, which brought on a ſpitting of blood. Theſe ſtones, by greatly irritating the lungs, may produce an inflammation there, and even a ſuppuration. See my *Obſervations*, p. 128. The only means of changing this diſpoſition in the blood to form ſtony concretions, is, by a proper diet to change the nature of the fluids in general.

Of Stones formed in the ſacculus lachrymalis.

The *ſacculus lachrymalis* is a kind of reſervoir, very narrow, and ſituated in the great angle of the eye. The tears which enter it through the *puncta lachrymalia*, are immediately conveyed into the noſe by the *ductus naſalis*. The ſtructure of this *ſacculus*, its ſituation, and the almoſt continual motion of the parts about it, will ſcarce allow the tears to remain there, and accordingly in its natural ſtate they do not lodge, nor are any ſtones bred in it; but, if they ſtop by any diſorder of the part, this ſac becomes a little dilated, and continues to dilate itſelf inſenſibly, ſo as to form what is called a flat *fiſtula*, and what ſome have named, the dropſy of the *ſacculus lachrymalis*. In this caſe, a ſtone may be formed in the ſac by the tears lodging there, unleſs care is taken to empty it pretty often by compreſſion; which compreſſion forces the tears up again through the *puncta lachrymalia*.

If

If the ſtone is begun to be formed, it cannot be diſcharged with the tears, but gradually increaſes; and, when it is arrived to any conſiderable ſize, is very eaſily diſcovered by its hardneſs. The only way of removing it, is by making an inciſion the whole length of the *ſacculus lachrymalis*, ſo as to extract the ſtone with a ſcoop. What remains to be done in regard to the dreſſings, and the cure of the *fiſtula*, I ſhall refer to the chapter of the *fiſtula lachrymalis*.

Of Stones that are found under the prepuce.

We never meet with ſtones under the *prepuce*, but where the patient has a *phimoſis*; and as this complaint is pretty common to children, ſo I have never obſerved the other to happen but in them.

Sometimes it was a ſtone which had paſſed through the *glans*; and not being able to make its way out of the orifice of the contracted *prepuce*, it lodged itſelf between the foreſkin and the *glans*; at other times it was an incruſtation formed at the *corona* round the *glans*, by the ſtoppage of the urine, and the ſtone had adapted itſelf to the form of the *glans*. In each of theſe caſes, the ſtone cannot be removed without performing the operation for the *phimoſis*. See the *Phimoſis*.

Of the Stones formed in the joints of gouty Perſons.

As common a diſeaſe as the gout is, the cauſe of it remains unknown; for, to ſpeak ingenuouſly, all the certainty we have about it ariſes from ſymptoms.

There is one kind of gout, the chief ſymptom of which is, the coagulation of the *ſynovia* that lu-

bricates the joints; and we often ſee ſtones formed in ſeveral, and, though very rarely, ſometimes in all the joints of thoſe who are afflicted with that diſeaſe. The pains which the patient feels render the motion of the parts uneaſy, and the inaction in conſquence thereof ſtill favours the propenſity of that fluid to coagulate. The ſtones which proceed from hence, ſeem to be of the nature of chalk; white, pretty ſoft, and friable. Their figure is more or leſs irregular according to the place where they are formed, and to which they adapt themſelves. When they are once formed, they obſtruct the motion of the joint: a freſh *ſynovia* concretes upon the firſt ſtone, and enlarges its bulk; the motion afterwards is quite deſtroyed, and the heads of the bones being gradually forced out of the cavities where they were articulated, an incomplete luxation enſues. Thus we find theſe limbs at length diſtorted, and incapable of moving without inexpreſſible pain.

As long as the *capſula* of the joint remains entire, the ſtone continues in it and encreaſes; but if the ſtone, by its bulk or ſome aſperities, at laſt penetrates the *capſula*, it brings on a ſuppuration in proportion to the degree of the inflammation. This inflammation extends to the ſkin, and forms a ſmall abſceſs between that and the *capſula*; and whether it breaks of itſelf or is opened, a number of ſmall ſtones diſcharges from the bottom of it, with the matter.

These abſceſſes muſt be dreſſed by dropping in ſome green balſam that may penetrate to the bottom of the ſore, which no ointment, that is leſs fluid than the balſam, can do. The whole muſt be covered with a plaſter, to prevent

vent the air from coming to the internal part of the ulcer.

The discharge will not entirely cease, because the *synovia* always yields a fresh supply of stones, and therefore it is very probable the opening will continue fistulous. If it heals up, it will break out again after some time, to give passage to fresh stones arising out of the *capsula*.

Of Stones formed in the Glands.

The motion of the fluids being very slow thro' the glands; it is not at all surprising, that stones should be formed there; and whenever the first particle of stone that is formed in them, encreases so as to be disproportionate to the excretory duct of the gland, it gradually grows larger. Sometimes these stony concretions are lodged in the tonsils, in the maxillary and sublingual glands; and oftentimes in tumors that are seated in the *abdomen*, and which owed their beginning to an obstruction of some of the glands in those parts. They have been found likewise in the *uterus*.

When these stones are so situated as to be within the reach of chirurgical assistance, they may be removed either by making an opening into the gland, or else by the extirpation of it. Sometimes it happens that the gland becomes inflamed, and an abscess ensues; in which case the stone comes away with the matter. Those stones which are formed in tumors situated in either of the great cavities, cannot be removed unless they produce an abscess in the gland where they lodge, nor can the abscess be cured unless the fluctuation of the matter is plainly felt externally, so as to allow a sufficient opening to be made into it.

Of Stones in the kidneys.

THE kidneys are conglomerate glands, ſituated in the region of the loins. Their uſe is to ſecrete the urine, which is impregnated with many different principles, varying in the ſame perſon according to the different diſpoſition he is in, and ſometimes changing twice or thrice in the ſame day according to the nature of his food.

ONE would naturally imagine that the ſecretion of urine is made very quick from the blood, there being generally a large diſcharge of urine as ſoon almoſt as we have drank any diuretic liquor; and yet, upon examining the ſtructure of the three ſubſtances which form the kidneys, it ſeems as if there muſt neceſſarily be a remiſſion in the motion of the fluids, to permit its ſecretion; and was it poſſible, at one view, to ſee the blood run into the emulgent artery, and the urine, that ſeparates from it, paſs into the *pelvis*, I doubt not but there would be a great difference found, between the courſe of the blood which ſupplies matter for the ſecretion, and that of the urine ſeparating from the blood and entering into the *pelvis*. Beſides, the blood is not always furniſhed with a large quantity of this fluid; and it is probable that at thoſe times when we void leaſt, the ſecretion is but very ſlowly made; and therefore the ſlowneſs with which the urine paſſes through the tubulous and mammillary ſubſtances to fall into the *pelvis*, may occaſion the formation of the grits of ſtone which are ſometimes found there, and which are undoubtedly concretions of

of the calculous principles that are found in the urine.

We do not meet with any ſtones lodged in the cortical ſubſtance of the kidneys; but great numbers of ſtony particles are ſometimes found in different parts of the tubulous ſubſtance, in the *papillæ*, and the *pelvis*. The figure of theſe ſtones is very irregular, and of very different forms; ſome being round, others angular; ſome with a ſmooth ſurface, and others very uneven.

Nor is it more eaſy to determine their ſize than that of ſtones ſituated elſewhere, for they increaſe daily: I have obſerved ſome which were very ſmall, others as large as nuts, and yet they all ſeemed to have been lately formed. The ſmallneſs of theſe ſtones, and the ſmoothneſs of their ſurfaces, are circumſtances greatly facilitating their diſcharge; ſo that, if the urine ſeparates at any time from the blood in a large quantity, a full ſtream carries theſe ſtones along with it; for which reaſon, diuretic liquors often bring away from the kidneys a great many ſmall ſtones, which, falling into the bladder, are diſcharged with the urine. But, if they are prevented from paſſing into the *pelvis*, either by their ſize, or their uneven ſhape, they grow larger in the ſubſtance of the kidney, and by remaining there, are ſometimes the cauſe of very bad diſorders. The ſame thing will happen if they do not proceed through the *ureter* after having paſſed into the *pelvis*.

If theſe ſtones are originally angular, or become ſo as they grow larger by the accidental acceſſion of new concretions, their angles prick and irritate that part of the kidney where they ſtop; and this irritation will produce an inflammation

of the kidneys, attended with a fever, a tenſion of the belly, and a fixed pain in the part; which pain is more or leſs acute according as the different parts of the kidney are affected. They will likewiſe occaſion irregular ſhiverings, and convulſive motions; alſo a frequent inclination to vomit, and ſometimes bloody urine, and theſe are often followed by many other ſymptoms.

We are to endeavour in this caſe to abate the inflammation by bleeding and other remedies proper for the different ſymptoms. The cauſe however ſubſiſting, the diſeaſe frequently terminates either in a gangrene of the kidney, or an abſceſs. If the kidney become gangrened, death muſt be the unavoidable conſequence, as it will be impoſſible to apply proper remedies to the part affected. If an abſceſs forms, the event of the diſeaſe will depend upon the part of the kidney in which the ſtone is lodged. If the ſtone is in the *pelvis* or in the *papillæ*, the abſceſs forms internally towards the cavity of the *abdomen*, and may penetrate into it, if the patient does not periſh firſt by the violence of the ſymptoms. But if the ſtone lodges in the tubulous ſubſtance near the cortical part, the abſceſs extends to the *membrana adipoſa*, and may poſſibly appear outwardly under the falſe ribs, within the breadth of three or four fingers of the ſpine. As ſoon as ever the fluctuation of the *pus* can be felt, it muſt be let out, and the ſtone ſeldom fails coming away with a large quantity of matter. There is a caſe of this kind in my *Obſervations*, page 229, which I ſhall beg leave to refer the readers to, as it will be more inſtructive upon this ſubject than any thing I can add here.

Of

Of Stones in the ureters.

THE *ureter* is a canal, or pipe, which, extending from the *pelvis* of the kidney, runs along the cellular ſubſtance of the *peritonæum*, and opens into the bladder an inch at leaſt from its orifice, between that and the *rectum*. This canal is very narrow, and though of a very ſtrong texture is capable of being diſtended, but contracts again by its elaſticity. Through this the urine, which ſeparates in the kidneys from the blood, runs into the bladder, and by the ſame way alſo, the ſmall ſtones which the urine carries along, either do, or ought to paſs. When theſe ſtones are round and ſmooth, they make their way without pain, ſo that frequently thoſe who void them with their urine, are never ſenſible of their paſſage through the *ureters*; but if they are at all large, or angular, they cannot paſs without difficulty, and their lodgment brings on nephritic pains.

THE different degrees of this diſorder depend upon the figure of the ſtone and the nature of the canal, which being deſigned only for a fluid, diſtends with ſome difficulty, when either the bulk of a ſtone is too large for its diameter, or ſo rough and uneven as to excoriate as it paſſes. Fortunately in ſuch caſes, the urine, which flows through, gradually carries this ſmall ſtone downwards; and hence we may learn the reaſon why the urine is ſometimes tinged with blood either before or after the ſtone has got through. When this happens, the patient is ſenſible of its paſſage, and his pains continue till it has paſſed into the bladder. Upon opening the bodies of thoſe who have been ſubject

to void ſtones, I have always found the kidney full of them, and the *ureter* of the ſame ſide much larger than in a natural ſtate. It has been ſometimes ſo much diſtended as to admit the introduction of a finger. Undoubtedly, in theſe caſes, the *ureter* had been dilated gradually, either by the ſtones which had paſſed through, or by the urine itſelf, which, when it drives a ſtone before it that paſſes with difficulty, muſt neceſſarily in ſome degree force, and thereby enlarge the diameter of that part of the *ureter* which is ſituated above the ſtone.

BUT the bulk of the ſtone may be conſiderably larger, and its aſperities very great; in which caſe it paſſes with ſtill greater difficulty; for the *ureter*, being very much irritated at the part where it compreſſes the ſtone, contracts itſelf more ſtrongly, and the ſtone is intirely ſtopt there. From this irritation proceeds an inflammation of the *ureter*, which inflammation extending to the *peritonæum*, to which it is connected by its cellular membrane, a fever enſues, and the pain increaſes with violent ſhootings. The urine cannot force the ſtone along, becauſe of the convulſive contention of the parts that ſuffer; and, unleſs effectual remedies are ſpeedily adminiſtered, the patient dies.

IF the *ureter* is ſtopt by the lodgment of a ſtone, ſo as quite to obſtruct the paſſage of the urine, it is reaſonable to conclude that forcing diuretics muſt rather be prejudicial than uſeful. The intention then to be anſwered is to abate the inflammation by frequent and copious bleedings, in proportion to the patient's ſtrength; by things that relax, as repeated *ſemicupia*, emollient cataplaſms, applied over all the region of the loins from the

ſpine

ſpine forwards; likewiſe by oily draughts, and in a word, by whatever may contribute to abate the convulſive tenſion of the *ureter*, and leſſen, if poſſible, that too great elaſticity which makes it preſs ſo ſtrongly upon the ſtone. If we are fortunate enough to effect this, the urine, which continually filtrates through the kidneys, may carry the ſtone with it: in this caſe the patient feels it paſs on a ſudden; and as the ſtone is fallen into the bladder and the compreſſion removed, the pain of courſe ceaſes.

But it may happen likewiſe, that though the inflammation be removed, yet the *ureter*, being obliged to yield to the bulk of the ſtone, thereby loſes its elaſticity, and remaining larger in this part than in any other, the ſtone continues there; and if there ſhould be a freſh acceſſion of gravel, that ſtops too, and the *ureter* is ſtill more dilated. Upon diſſecting a woman who had been executed, I found the middle of the *ureter* diſtended ſo as to admit a collection of three ounces of gravel, through which the urine paſſed and filtrated as through a bed of ſand. This woman muſt certainly have ſuffered greatly when the gravel firſt began to ſtop. The other part of the *ureter* was in its natural ſtate.

I have found likewiſe in the *ureters*, either on one ſide or the other, but never in both at a time, ſome ſtony ſubſtances adapted to the figure of the *ureter* itſelf, and which entirely filled it. Theſe ſubſtances had been formed probably by the collection of an infinite number of grains of ſand, which had been brought away from the kidney with the urine, and cemented together. I never obſerved any of theſe concretions but in ſuch people whoſe bladders were become

callous

callous by having long ſuffered from the lodgment of a ſtone in them; and undoubtedly this hardneſs or calloſity had alſo contracted the entrance of the *ureter* into the bladder; and the *ureter*, we know, is in its natural ſtate very narrow as it paſſes between the membranes of the bladder before it opens into the cavity. And hence it was that the gravel, being unable to make its way into the bladder, was accumulated in the *ureter*. Theſe perſons have never complained of any other nephritic ſymptoms except ſlight twinges in the kidneys.

Of the Stone in the bladder.

STONES may be formed in the bladder by a collection of ſmall gravely ſubſtances, which unite and adhere together, in like manner as has been deſcribed in ſpeaking of the *prepuce* and the *ureter*, and as will alſo appear in the *Obſervation* hereafter related; but thoſe which are generally found in the bladder, or which paſs from thence, proceed from one of the kidneys, and are brought down by the urine.

UPON their firſt entrance into the bladder they are but ſmall, and when patients who are ſubject to the gravel perceive that a ſtone has got through the *ureter*, they ſhould be inſtructed in what manner they ought to diſcharge their urine, in order to facilitate the paſſage of the ſtone out of the bladder.

THE urine is ſecreted in a much greater quantity, and ſooner, by drinking ſome diuretic liquor; and the ſtream carries with it the ſmall ſtones that are in the kidneys. The caſe is the ſame with the ſmall ſtones that are fallen into the blad-

bladder, ſince nothing but a flow of urine can carry them along, and forward their paſſage out. A patient therefore who has reaſon to believe that a ſmall ſtone has paſſed down, ought, after having drank ſome diuretic liquor, to let his bladder be ſufficiently filled to give him a ſtrong inclination to make water. This done, he ſhould place himſelf upon his knees, with his body inclining a little forwards, for in this poſture the ſmall ſtone will by its own weight naturally approach the neck of the bladder, as a cork within a bottle falls down into the neck of the bottle when turned upſide down. The urine, by this means, flowing out very plentifully, muſt neceſſarily carry along the ſtone much eaſier than if theſe precautions had been omitted; and I am fully perſuaded, that if thoſe perſons who are troubled with the gravel would always obſerve theſe rules, we ſhould not find ſo many of them ſubject to the ſtone.

If the ſtone continues in the bladder, it daily increaſes, by the acceſſion of freſh *ſtrata* which are formed there. While it is ſmall, it floats in the urine, and often changes its ſituation according to the different attitudes of the body; but when it has acquired a certain degree of weight, it no longer floats in the urine, but, by the frequent contractions of the bladder, and being forced on by the urine, it generally approaches the neck; unleſs the ſtone adheres to the bladder, or is lodged in one of thoſe cavities which are ſometimes found in bladders that have formed cells.

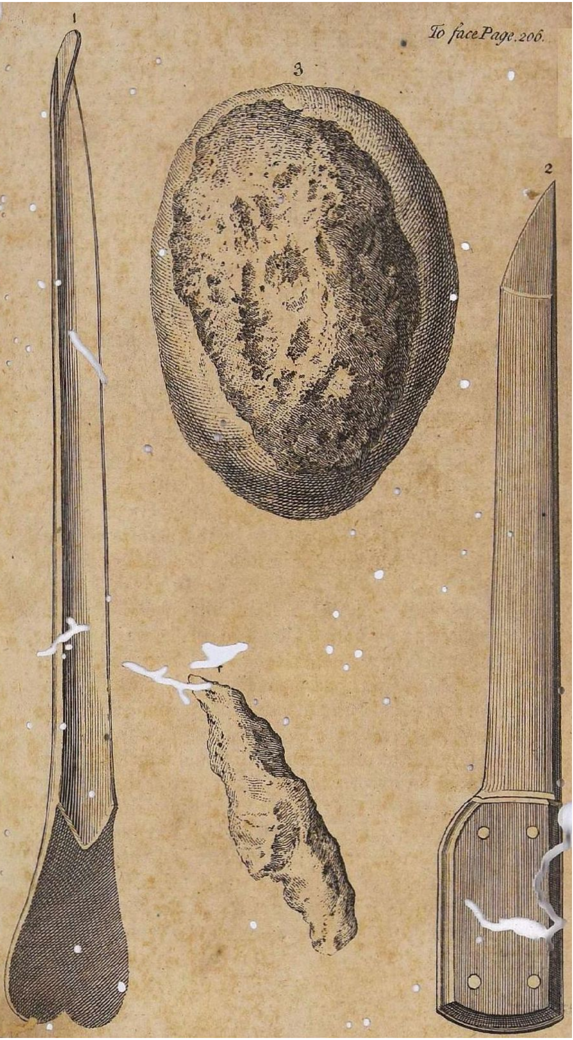
Before I enter upon the diagnoſtic ſigns of a ſtone in the bladder, it may be proper to ſay a few words of ſtones which adhere, and of the differences

ferences that are ſometimes obſervable in different bladders, as theſe two particulars are very neceſſary to be known.

Of Stones that adhere.

I AM thoroughly ſenſible of the impoſſibility that an animated body which ſubſiſts by a circulation of fluids, and another body which owes its bulk intirely to an appoſition of matter, ſhould become one and the ſame by any kind of adherence, let it be ever ſo ſtrong; and therefore I muſt condemn thoſe operators, who, when they have not been able to extract a ſtone, have made uſe of this pretended adheſion as a defence againſt cenſure; alledging that it was better to leave the ſtone behind, than to pull out the bladder with it. That there are ſtones which adhere, I make no doubt, becauſe I have ſeen inſtances of them; but theſe adheſions are not of that nature to prevent the extraction of a ſtone, provided it can be laid hold of with the forceps. In 1730, I cut a lady, and extracted a ſtone that weighed ſeven ounces and a half. One ſide of it was uneven, likewiſe three inches long, and two and a half broad, and was in a manner intirely incruſted upon that part of the bladder that is connected to the *inteſtinum rectum.* This incruſtation was occaſioned by the inequalities of the ſtone, which had produced an excoriation of that part of the bladder upon which they preſſed; and in conſequence thereof a number of fleſhy or fungous excreſcences aroſe from this ulcer, and had lodged themſelves in theſe cavities of the ſtone; the ſhape of which may be ſeen in the copper-plate annexed, *fig.* 3. The adheſion was ſeparated with

To face Page. 206.



hardly any pain; and it is probable I ſhould not have taken notice of it, but by the inſpection of the ſtone which had brought away many of theſe excreſcences with it. I have now the ſtone in my poſſeſſion, and the marks of its adherence may ſtill be ſeen; and what fully convinced me there had been an adheſion, was, that ten days after the operation, the diſeaſed part of the bladder ſloughed away, caſting off three pieces of membrane, which were each about a quarter of an inch thick, about an inch in diameter, and paſſed with the urine.

I HAVE ſince this extracted from three patients, ſtones which adhered in the ſame manner, but the ſurface of their adheſion was not ſo large in proportion to their ſize: theſe patients were all cured, ſo that I had an opportunity of examining the bladder only of one of them, who died ſome months after of an hæmorrhage from the noſe, and nothing was to be ſeen in it but a *cicatrix*.

IT is certain alſo, there are ſometimes ſtones ſo fixed in the bladder that they cannot change their ſituation. In 1715, I was preſent at an operation performed by the late Monſ. *Marechal*, when he extracted a ſtone from the bladder which was ſhaped like a calabaſh or gourd, and brought with it a *fungus* which encircled the ſtone at its narroweſt part. As this fungous excreſcence paſſed round and covered the middle of the ſtone, no new *ſtrata* could be formed in that part, but were made at the two extremities, which was the reaſon of its being ſo ſhaped; and the *fungus* fixed it ſo in the bladder that it could not poſſibly change its ſituation. Hence then it appears, there may be ſtones which adhere to the bladder, and others ſo fixed in the bladder that they cannot

preſent

present themselves at its orifice. These adhesions, indeed, are never very strong; but, though they cannot prevent the extraction of the stone, they are sufficient, as long as they subsist, to hinder its presenting itself at the orifice of the bladder.

Of the different shape of the bladder.

THE bladder, even in a healthy state, is not always alike in all subjects, any more than the other parts of the body. Some, for instance, resemble a pear, being large at their *fundus*, and small towards their neck; others are almost as large at the neck as at their *fundus*. These differences may be answerable to the shape of the *pelvis*, which is sometimes very large, sometimes very narrow.

THERE are some bladders which are naturally very narrow where the *ureters* open into their cavity, and very large above that part. These, when they have suffered by the lodgment of a stone, become sometimes so contracted in this part that the bladder seems to be thereby divided into two, and to resemble a calabash or gourd, that is, to form a small bladder where the orifice is situated, and another very large adjoining to it. As it is the posterior part of the bladder, nearest the *rectum*, which suffers most by the lodgment of a stone, so it is this part separating the entrance of the two *ureters* that forms this contraction. In which case it grows thick like membranes that are inflamed, and forms a kind of *septum*, so that when a patient lies upon his back, a stone of a moderate size may be concealed behind it, and the *catheter*, though introduced at the neck of the

the bladder, and paſſed beyond the ſtone, may not happen to touch it.

In ſome bladders ſeveral cavities or cells have been found, large enough to contain a nut in each. Theſe cells were ſituated indifferently in reſpect to the neck of the bladder, or its *fundus*, but always in the ſides towards its poſterior part. I have ſeen other bladders where the entrance of the *ureter* was ſo greatly diſtended, that it ſeemed as if the ſtone had lodged there a conſiderable time. In 1732, I cut a patient who had a ſtone fixed in the *ureter* like a diamond in its ſocket, but did not enter the bladder above one third of an inch; which prevented me on the day of the operation from taking hold of it with the *forceps*: but, finding about ſeven weeks afterwards it had made its way into the bladder about half an inch, I got hold of it, and brought it out. It was two inches in length, and without doubt would have continued as fixed in its ſocket as before, had there not been a ſuppuration in that part. Its form may be ſeen in the print, *fig*. 4.

From conſidering theſe different ſhapes of the bladder, it is natural to ſuppoſe that the ſtone may ſometimes not preſent itſelf at the orifice; of which take the following proofs.

Patients have been ſearched, and being convinced they had the ſtone, have taken medicines for a conſiderable time to diſſolve it; in ſhort, their pains have ceaſed, they have lived ſeveral years after, and imagined themſelves cured; but dying of ſome other diſorder, they have been opened, and ſeveral ſtones were found in the *fundus* of the bladder, which was contracted in its middle as was before deſcribed. It may be aſked, why they were ſo long without feeling any

pain upon making water? The anſwer to this, is, the ſtone, having changed its ſituation, had lodged itſelf in this poſterior part of the bladder, and no longer preſſed upon the orifice. In 1734, I ſearched a patient, and feeling a ſtone, he reſolved to be cut; but from the very day he was examined, his pains ceaſed, and I thought it proper to defer the operation, both on account of his age, which was ſeventy-four, and of his being lately recovered from a dangerous fit of ſickneſs. This reſpite laſted about three weeks, during which he did not feel the leaſt uneaſineſs; but at the expiration of that time, he came to me again, the pains returning upon him with great violence, and I cut him three days afterwards, when I extracted a ſtone that weighed four ounces. In all probability, by ſearching him, the ſtone had been puſhed back, and conſequently as it no longer preſſed upon the neck of the bladder, it gave no uneaſineſs, but being brought there again by the urine, the pains returned.

We daily meet with perſons afflicted with the ſtone, who tell us, that their urine comes away in the night without hurting them; but in the day, they either make it with much pain, or cannot void it at all. Upon enquiry, we find, that in the night they make water as they lie upon their ſide; which ſituation of the body does not incline the ſtone to preſent itſelf at the orifice of the bladder, whereas an erect poſture occaſions it to fall down there.

In 1740, I attended a patient whom I had examined, and felt a ſtone with the *catheter*, which inſtrument he had kept in, and confined himſelf to his bed for ſix months, having by the help of that been freed from pain in voiding his urine; but

but when he got up to have his bed made, if he took out the ſtilet, the pains would return when the urine was almoſt diſcharged.

I MUST here remind the reader of the caſe where the ſtone adhered, which was mentioned in page 206. It weighed ſeven ounces and a half, and probably had been growing between twelve and fifteen years, and yet when I ſearched the patient it had not begun to pain her above three weeks. This was owing to the ſtone's adhering to the bladder, ſo that it did not touch the orifice; and the pains did not begin till the ſtone, being enlarged by the addition of new gravelly *ſtrata*, preſſed upon the orifice of the bladder. From the foregoing conſiderations, it is reaſonable to infer, that the preſſure of the ſtone upon the orifice of the bladder is the chief cauſe of the pain.

SIGNS. We find, by experience, that a ſtone in the bladder generally occaſions an irritation and an excoriation there, with a callous induration, a retention of urine, or a continual motion to make water. Theſe ſymptoms, of which we are going to give a more particular account, may ſerve as diagnoſtics. They may enable us likewiſe to judge pretty nearly of the bulk of the ſtone, and its ſurface: but we have no ſign to diſtinguiſh whether a ſtone adheres or not; or whether it is fixed in any part of the bladder, or is lodged in any particular cavity.

OF the ſigns beforementioned ſome are doubtful, others are ſo certain as leave no room to queſtion the exiſtence either of one or more ſtones.

IF a patient feels a pain in making water, and the urine ſometimes ſtops on a ſudden, but has a free paſſage immediately afterwards, this is proba-

bly owing to a ſmall ſtone being brought by the urine to the neck of the bladder, and preſenting itſelf at its orifice, hinders the urine from paſſing. This ſymptom ceaſes as ſoon as the ſtone is removed, and intirely diſappears when the ſtone is grown too large to enter the orifice of the bladder.

A FREQUENT itching in the *penis*, even when the patient does not want to make water, is another doubtful ſign. Children, that have the ſtone, are always pulling that part. This itching, which is occaſioned by an irritation produced by the ſtone in the bladder, communicates itſelf to the *urethra*, and may be compared to that which children feel at the noſe when they are troubled with worms. We may judge by this ſymptom that the ſurface of the ſtone is uneven.

ANOTHER uncertain ſign is the having glairs or films in the urine, whether they appear after the urine is grown cold, or before; but if this ſymptom is not attended with any other, it may indicate only ſome indiſpoſition of the bladder.

A FREQUENT or continual motion to make water, the uſual conſequence of the irritation cauſed by a ſtone, is likewiſe an equivocal ſign, ſince this may equally attend a diſeaſe of the bladder.

IN this claſs too we may reckon the *pus* which is ſometimes found in the urine; as it may be produced either by the ſtone, by ſome diſorder in the bladder, or a diſeaſe in the kidneys.

THERE is one ſymptom leſs doubtful than any of the former, which ſometimes happens to thoſe who have the ſtone, and that is, they cannot ride on horſeback, or in any carriage, without making bloody

bloody water. This indeed does not happen, but where the ſtone is either angular, very uneven, or elſe adheres to the bladder. If it adhere, the jolting may ſeparate it intirely, as the adheſion is but ſlight; or it may break only ſome part of the adheſion, which will produce an hæmorrhage in like manner as happens to pregnant women, whom a fall or violent jolt will occaſion to void blood by ſeparating part of the *placenta.* If the ſtone is angular, its points may wound the bladder.

THERE is one ſign which I look upon as certain; and that is, the violent pain the patient feels in making water when he tries to void the laſt drops. This pain proves there is a ſtone, and that it lies and preſſes upon the neck of the bladder when the bladder contracts itſelf to expel the laſt drops of urine.

BUT though this laſt ſymptom certainly proves the exiſtence of a ſtone in the bladder, yet the being free from it is not a deciſive argument of the contrary; for many patients have been known to have the ſtone (as was before obſerved in ſpeaking of ſtones that adhered, and of the different ſhapes of the bladder) who nevertheleſs diſcharged their water without pain; but as appearances are often deceitful, we may add, that this is not the only inſtance wherein we are greatly embarraſſed to determine with certainty, whether a patient has the ſtone or not.

THE bladder is ſubject to many different diſorders, ſome of which are attended with a pain in making water; and it is chiefly in this laſt ſymptom that a ſurgeon may be deceived, from the uncertainty of the other concomitant ſymptoms: for frequently there is reaſon to think the pain

is caused by a stone, though there is none; and sometimes it seems occasioned only by a disease of the bladder, and yet there are stones. Such, for instance, are the almost constant pains a patient feels there, besides those which are felt particularly upon making water; and the ceasing of these pains for many days together, even when he does make water. Such also is the *pus*, which flows in great quantities, either mixed with the urine or after discharging it; likewise the patient's not being able to empty his bladder every time he makes water, with the frequent retentions of urine and the colour of the *catheter*, the end of which comes out black whenever the patient is searched.

In this case, regarding only the disorder of the bladder, an opening has been made in *perinæo* like that which we use when we cut for the stone, with an intent only to introduce a *canula* into the bladder, in order to throw in proper injections; but how frequently upon these occasions have stones been brought away, which were never suspected to have been lodged there?

I could produce many instances that have happened within my own knowledge of stones coming away in this manner: amongst others, I shall present the reader with the following; for as the symptoms of this disease may vary in many circumstances, it is by observations only we can distinguish its signs, and learn the proper methods of treating it. The case which I am going to relate may probably be very conducive to that end.

In the beginning of 1739, a gentleman felt at different times, some slight pains in making water, which became daily more frequent, so that in 1740, he was almost constantly voiding it, but dis-

discharged only four or five ſpoonfuls at once. He neglected this diſorder for ſome time, but in *October*, being ſeized with a retention of urine and in great pain, he had recourſe to his ſurgeon Monſ. *Bimont*, who ſearched him and drew off neart hree quarts of water. The bladder could not be ſo diſtended as to hold this quantity without loſing its elaſticity; accordingly the patient was till *June*, 1741, without making water but by the help of the *catheter*, which was now and then taken out in order to clean it. Frequently, after the urine was diſcharged, ſome matter would iſſue out, of a very offenſive ſmell. I was then conſulted, and we judged that the bladder was in ſome meaſure paralytic; for otherwiſe it is not uſually ſo long before it recovers its tone after a violent extenſion. It was agreed to throw in ſome vulnerary and detergent injection through the *catheter*, night and morning, which was continued near three months; and at the end of that time he made water for about a fortnight without the *catheter*, but was afterwards obliged to have it paſſed again, and, till the month of *November*, had frequent intervals of between ſeven and eight days, in which he could diſcharge his urine without this inſtrument. It is proper to obſerve here, firſt, that though he ſometimes voided five or ſix ounces at once, yet his bladder was not emptied; for, in order to be ſatisfied about this, we paſſed the *catheter* again after he had made water, and brought away near four ounces more, mixed with *pus*. Secondly, that this patient was only ſometimes in great pain when he made water, and that this pain abated, and even ceaſed before he had done. Thirdly, that the *catheter* having been introduced in the ſpace of eighteen

eighteen months above thirty times by Monſ. *Bimont*, and three or four times by me, we had never felt any ſtone in the bladder, though we had ſearched him both in an erect and ſupine poſture. Fourthly, that the patient was extremely lean, and had a hectic fever, occaſioned, no doubt, by his frequent pains, want of reſt, and the diſorder of his bladder which conſtantly ſuppurated. All theſe circumſtances conſidered, there was no room to queſtion the bladder's being in a ſtate of ſuppuration, and it was to this diſorder alone we judged all the concomitant ſymptoms ought to be imputed; and conſequently, as that particularly engaged our attention, our curative intentions were directed accordingly. The ill ſtate of the patient, who viſibly waſted away, induced us to propoſe to him an operation by which we might eaſily diſcharge the *pus* that continually lodged in the bladder, and inject proper medicines to cure it. He conſented to this, and as he had long been under a very ſtrict regimen, there was no occaſion for any further preparation.

The patient being put into the ſame poſition as in cutting for the ſtone, I introduced the ſtaff, and cut upon it in the ſame manner as will be deſcribed in the operation of *lithotomy*. After this, conveying the *gorget* into the bladder, I drew out the ſtaff, and thruſt my finger beyond the neck to dilate the opening; and then introducing a *canula* into the wound, left it there. This *canula* was as large as one's little finger, and of ſuch a length, that one end might reach into the bladder beyond its neck, whilſt the other remained out of the wound. The patient was afterwards returned to his bed, and the *canula* ſecured in its place by the bandage uſed in *lithotomy*.

The

The *canula* continued in till the fifth day, during which time abundance of very fœtid *pus* flowed out with the urine.

When the wound began to ſuppurate, the *canula* was removed without difficulty, and we ſubſtituted a tent in its ſtead, which contained a ſmall leaden *canula* in the middle of it. This tent was of the ſame ſize with the firſt *canula*, and kept the ſides of the wound open; but by its bulk it would have prevented a diſcharge of the urine, had it not been for the little leaden pipe incloſed, which afforded a paſſage. The tent was armed with a digeſtive to promote a ſuppuration throughout the whole extent of the wound, and likewiſe in the neck of the bladder, which had ſuffered during the progreſs of the diſeaſe.

As ſoon as the wound had ſuppurated, I began night and morning, by means of a female *catheter*, which was introduced after removing the tent, to paſs ſome injection into the bladder. During the firſt days there flowed out, beſides urine, above a pint of very fœtid matter; and the *catheter*, when withdrawn, looked as black as ink. At this time, not above two or three ounces of injection were thrown in at once; and as ſo ſmall a quantity excited a motion in the patient to make water, it induced us to believe that the bladder could not contain more; but from day to day, in proportion as it ſuppurated, it grew more relaxed, and would admit a larger quantity of the injection.

Twelve days after the operation, feeling a ſtone in the bladder, with the *catheter*, I introduced a ſmall pair of *forceps*, and extracted one about the bigneſs of a pea. Three days afterwards I felt another ſtone, which was extracted in the ſame manner, and was as large as a cheſnut. Each of

of theſe were almoſt round, very ſmooth, and a little flatted on the ſides. There was but very little *pus* came away after the extraction of theſe ſtones, and the wound ſeemed to heal every day, for the urine paſſed freely through the *canula*, and without pain, except ſome few ſlight twinges that the patient felt when the bladder contracted itſelf; and this induced me to leave in the *canula*, which gave him no uneaſineſs.

In the mean time the hectic fever, with the looſeneſs, ſtill continued, attended with a loathing of all nouriſhment; and the patient, who was likewiſe ſubject to frequent vomitings, viſibly waſted away, notwithſtanding the moſt proper medicines were preſcribed by Monſ. *Gouttard* his phyſician. In this melancholy condition he remained three months, and then died in a perfect *maraſmus*.

I opened him, and found all the parts of the *abdomen* in a ſort of decay and waſting, and in ſeveral places a ſuppuration. The bladder was very ſmall, having loſt the habit of being dilated by the urine which paſſed freely through the *canula*. It was not thickened like thoſe that are grown callous, but quite in a decay, like the other parts. Six or ſeven ſmall ſtones were contained in its cavity, of the ſize of millet ſeeds; and upon cloſely examining the internal ſurface, a number of ſmall gravelly particles, of the ſame ſize, came out from thence, as if each had been lodged in a particular cell. There were more than fifty of theſe, all of the ſame ſize.

This obſervation affords us a convincing proof, that ſtones may be formed in the bladder, and conſequently that thoſe which are found there do not come always from the kidneys. It likewiſe teaches

us that there may be one or more ſtones in the bladder, and yet they may not preſent themſelves at the neck of it when the urine iſſues out.

To conclude, notwithſtanding an experienced ſurgeon may by all theſe ſigns be convinced that there is a ſtone in the bladder, yet a patient will not be convinced of it himſelf till he has been ſearched, and the ſtone felt with the *catheter*. Upon this conſideration therefore the ſurgeon ſhould examine him, and it would not be amiſs to let the patient feel the ſtone.

Of the introduction of the catheter, or the manner of ſearching.

A SURGEON, to perform this operation properly, ſhould be well acquainted with the ſhape and winding paſſage of the *urethra*, through which the *catheter* muſt paſs into the bladder; and he ſhould take care that the patient be placed in a proper poſition.

I NEED not deſcribe the form of the *catheter*, ſince that is well known. The curvature of it ought to be proportionable to the make of the patient, which may be gueſſed at ſight; and the ſize of it ſuitable to the diameter of the *urethra*, which may be judged by the orifice of the *glans*. A pretty large *catheter* always paſſes better than a ſmall one, as by dilating the paſſage, it makes a ſmall opening before it, and thereby follows its courſe more eaſily; whereas if a ſmall one is made uſe of, the ſides of the *urethra* do not open thus before it as the inſtrument advances. Beſides, to perſons who are difficult to be ſearched, a ſmall *catheter* may happen to penetrate the internal coat of the *urethra*, and open for itſelf a falſe paſſage, which

which cannot easily happen by the use of a large one.

When we search a person for a suppression of urine, it should be done in his bed, and lying on his back, with the breast somewhat raised, and the knees a little bent and spread. If we search him to find whether he has the stone, it must be done, if possible, whilst he is standing, that the stone, which in this posture generally falls down upon the neck of the bladder, being brought thither with the urine, may strike against the end of the *catheter*. For want of this precaution the stone has frequently been missed; but, if we cannot avoid searching him in bed, he must be turned, if possible, and made to sit upon the bed-side, when the instrument is introduced.

Again, when we search a patient for the stone, it must be done when he has an inclination to make water, for if he has lately discharged his urine, it is probable you will not feel the stone. If, however, it is necessary to search the patient immediately, we may make an injection into the bladder through the *catheter*, to supply the want of urine; then letting it out again, we shall feel the stone with the last drops.

Men may be searched by turning the handle of the *catheter* towards the belly; in which case we need only follow the course of the *urethra* with the end of the *catheter*: or we may introduce it by turning the handle at first towards the knees till the instrument is advanced to the entrance of the curvature of the *urethra*, and then turn the handle towards the belly.

Having oiled the *catheter* to make it slip, I support the *penis* with three fingers at the *corona glandis*, taking care not to compress the *urethra*, which

which is ſituated under the *corpora cavernoſa*; and I gently introduce it through the *urethra* into the bladder. The great art in ſearching is to have a kind of intelligence between the hand that ſupports the *penis*, and the other which directs the inſtrument, for they ought to act ſo in concert that alternately the *catheter* may be thruſt into the *penis*, and the *penis* drawn forward upon the *catheter*. This caution is particularly neceſſary when the end of the inſtrument reaches where the *penis* is joined to the *os pubis* by the *ligamentum ſuſpenſorium*, and when it comes to the curvature of the *urethra* to paſs under the *os pubis*. This I think is certain, that in paſſing the inſtrument we ought rather to draw the *penis* upon the *catheter*, than to puſh the *catheter* into the *penis*.

WOMEN are to be ſearched only in a ſupine poſture; but it is much more eaſily done in them than in men, as their *urethra* is almoſt ſtraight. The method of doing it is to open the *labia*, and introducing the end of the female *catheter* into the orifice of the *urethra*, you turn the curved part of it towards the *os pubis*, and paſs it gently forwards till it gets into the bladder.

IN either ſex, we know when the *catheter* reaches into the cavity of the bladder, by the urine running out at the orifice which is in the handle of this inſtrument. The patient muſt then be placed in the poſture before directed, and upon taking out the ſtilet, the urine flows out. If the ſtone is large, it is eaſily felt; if ſmall, it will not be perceived till the urine is upon the point of being all diſcharged.

WE muſt be thoroughly aſſured that what we feel is a ſtone, for I have often felt the bottom of the bladder reſiſt the end of the *catheter*

ter in ſuch a manner as to induce me to believe there was either a *fungus* there, or ſome other indurated ſubſtance: and I have known people cut upon this ſymptom only, and no ſtone could be found. This therefore ought to make us very cautious in pronouncing that there is a ſtone.

In drawing out the *catheter* from men we bring the handle gently towards the patient's belly, and it eaſily ſlips out. In withdrawing it from women, we take care that it follows the ſame courſe as it had in its entrance.

Prognostic. When it is once certain that the patient has the ſtone, the next conſideration regards the cure. There are many caſes wherein this may probably be expected; as on the contrary there are others which afford no hope of ſucceſs.

If the patient feels continual pains in the bladder as well when he has as when he has not a motion to make water; or if a preſſure upon the *os pubis* occaſions a pain in the bladder, it is probable that is the part diſeaſed, and he will die in all likelihood notwithſtanding our utmoſt care.

If he feels as much pain when he begins to make water as in diſcharging the laſt drops, there is reaſon to believe the bladder is diſeaſed, and we generally find ſome matter comes away, which certainly proceeds from a ſuppuration in the bladder. If the pains are but ſlight, and only felt with the laſt drops, and yet we find in the urine a mixture of *pus*, this proceeds from one of the kidneys, or *ureters*; and though the patient may be cured of the ſtone, he may die of the ulcer that produces the matter.

If the patient has a hectic fever, it indicates ſome latent ſuppuration, and nothing can ſave his life.

6 If

If he has great pains in the loins, and yet voids no gravel, either the kidney or *ureter* is diseased, and he may die from the disorder of these, in which there probably is a stone formed.

Hard stones are for a considerable time less likely to create much disorder than the soft stones, as these latter encrease much quicker.

If a patient cannot retain the same quantity of water when lying as he does standing, probably the bladder is become callous. This however is not a reason why he may not be cured by an operation well performed, provided there is no particular bad circumstance that prevents it. I have extracted some very large stones by the operation, which the bladder so closely compressed that I could only take hold of one end of them, and yet the patients have done well. When the extraneous substance is removed, the bladder, unless it has suffered any particular hurt in the operation, will suppurate of itself; and by the help of injections it grows lax again, and recovers its former state, so that, the wound being healed, the urine may be contained there as usual:

Patients who are very lean and emaciated, are subject, after the operation, to a *fistula in perinæo.*

The larger the stone is, and the more it pains the patient in being extracted, the greater room there is to apprehend an inflammation.

If a patient is constantly subject to nephritic pains, and voids small stones at the same time that he has a large one in the bladder, there is great reason to fear a relapse; for the source of the stony concretions still remains, and after the first stone is extracted, and the wound healed, a second may stop in the bladder, and increase there.

Wo-

Women are less subject to the stone than men, which may be accounted for from the different structure of the parts. A small stone may pass from their bladder through the *urethra* more easily than in men, because the neck of the bladder is not inclosed and compressed by the *prostatæ* as in men; and for this reason we seldom find they have a stone of any considerable size.

Cure. A person who has a stone in the bladder, if he can be cured at all, it must be by one of the three following methods, *viz.*

By dissolving the stone with proper injections into the bladder through the *catheter.*

By effecting the same thing from the use of internal medicines.

Or extracting it by the operation of lithotomy.

It were greatly to be wished, that any medicine could be discovered, which being injected into the bladder, would dissolve a stone there without affecting the bladder at the same time. Liquid caustics, such as spirit of nitre, *aqua fortis, &c.* will soon destroy a stone in a vessel, and would do the same in the bladder; but by ulcerating it, they would bring on a worse disease than the other. These medicines being diluted will likewise dissolve a stone by degrees, but in the same proportion as they acted upon the stone, they would also act upon the bladder.

The want of a dissolvent which would have no ill effects upon the bladder, has induced people to seek for remedies which should give such a disposition to the blood, that the urine itself might become a dissolvent. There have been people in all ages, who have boasted of infallible remedies for this purpose; remedies of which, according to their account, they had made repeated trials, and

and which would reduce the ſtone into ſand or ſlime, and thereby facilitate its paſſage with the urine. They have more eaſily perſuaded patients into a belief of this, as it is natural to dread the pain and danger of an operation; but none of theſe remedies have hitherto, at leaſt to my knowledge, proved ſucceſsful. They have been known indeed to make the urine ſlimy, and this ſlime has formed a ſoft covering round the ſtone, which has ſecured the bladder from the aſperities that, by fretting it, occaſioned pains there; and hence, many patients, being no longer tormented, or ſuffering but little in compariſon with what they felt before, have imagined themſelves cured; and they have been confirmed in this opinion by ſeeing their urine full of ſand and ſlime, which they looked upon as a ſeparation from the ſtone. But their ſecurity was not of long duration; for theſe lays of ſlime have ſucceſſively hardened, and the ſtone has been thereby covered with a new *ſtratum*; and when they either left off the uſe of theſe medicines, or their urine ceaſed to be ſlimy, the laſt coat grew hard, and they were ſoon attacked with freſh pains.

NEVERTHELESS, though theſe medicines may not diſſolve the ſtone, they may in ſome circumſtances be uſeful. I have known patients ſo much waſted and weakened by pain and want of reſt, that they were not able to undergo the operation; and yet by taking theſe medicines they have recovered their ſtrength and fleſh, and have afterwards had the operation performed. I would not therefore utterly condemn the uſe of them, eſpecially as it is not impoſſible but that ſome of them may have been, in ſome inſtances, ſucceſsful. Beſides, many

things may have conduced to deceive people, as to the experiments that have been made upon these occaſions. Firſt, he who ſells the medicine finds his intereſt anſwered in publiſhing its efficacy, whilſt the ſurgeon, who knows the operation is the ſureſt and ſafeſt remedy, cannot ſubmit to ſee a patient languiſh under the uſe of an uncertain one; which, as he knows not what it is, he cannot either approve or blame.

SECONDLY, a ſtone may change its ſituation in the bladder whilſt the medicine is taking, and, no longer preſſing againſt its orifice, be no longer felt; upon the ſtrength of which, the patient proclaims himſelf cured, though in reality he ſtill has the ſtone.

THIRDLY, a patient who is free from pain will not ſubmit to be ſearched, and yet nothing but the introduction of a *catheter*, with the cautions before laid down, can make the certainty of his cure appear. Nay, it may even be neceſſary to repeat the uſe of the *catheter*, as there have been inſtances where this inſtrument has been paſſed three or four times before the ſtone could be felt.

FOURTHLY, a ſurgeon, who has ſearched a patient, and propoſes the operation, in all probability ſees no more of him, if he has recourſe to theſe kinds of medicines, and therefore is equally ignorant of the good or ill effects of them.

FIFTHLY, we find many ſtones, which are certainly formed of different ſubſtances, ſince ſome are as hard as free-ſtone, others as ſoft as chalk, and ſome like the droſs of iron; ſome are red, others white, or black; and it is unreaſonable to believe that the ſame medicine can have a power of diſſolving all. Suppoſing therefore one patient

cured,

cured, becauſe the medicine happened to be proper to act upon the ſtone in his bladder, others on the contrary are not cured, by its proving improper in their caſes; and this alone is ſufficient to diſcredit the remedy. To conclude, many people of all ages, after having taken the moſt highly-applauded medicines of this kind for many months, and without ſucceſs, have been obliged to be cut at laſt.

But whilſt we are upon the ſubject of medicines which are ſuppoſed to diſſolve a ſtone in the bladder, it may not be amiſs to relate what I ſaw happen to a patient who took them.

In 1732, an officer, who had a ſtone in his bladder, which gave him great uneaſineſs, thought to have avoided the pain of an operation by taking a ptiſan and a powder, whoſe infallible virtues had been boaſted of to him with great aſſurances by one *Beaulieu*; and he accordingly took them for above eight months. But when his health was by this means much impaired, and he complained to his quack, he ordered him nothing elſe for his relief but to dilute plentifully, and to bathe.

At ten months end he came to me, and giving an account of what had been done, ſhewed a couple of lumps as large as tennis-balls, which he had formed of the gravel and ſand that he had voided with his urine, and which, as they dried, had ſtuck together. Being perſuaded that all this had come off from the ſtone, and that it muſt be quite diſſolved, he was ſurpriſed that his pain in making water daily grew worſe. Whereupon I aſſured him that he ſtill had the ſtone; and that, inſtead of its being waſted away, it had been increaſed by the uſe of thoſe medicines, which ren-

dering his urine ſlimy, had occaſioned a more ſpeedy acceſſion of new *ſtrata*. Accordingly I ſearched him, and found a large ſtone, which I made him feel. He reſolved, upon this, to undergo the operation, and was cut eight days afterwards, when I extracted a very hard round ſtone, which weighed half a pound.

The very day after, the urine, which ran out through the wound, ſmelt extremely offenſive; and the parts upon which it came, as the *perinæum*, the buttocks, and even the linen that was under him, were incruſted over with lays of ſtony concretions, that looked like maſtich hardened upon them. It was to no purpoſe to remove them; for others immediately followed, and the ſame kind of incruſtations covered the whole extent of the wound from the *perinæum* to the bladder. They were of a brown colour, and ſo hard and ſolid, that they, in ſome meaſure, ſtopt the paſſage of the wound; and when I introduced a *catheter* into the bladder to throw up ſome injection, it was like paſſing it up a pipe of freeſtone. In this condition the patient remained for two and twenty days, without our being able either to remove the incruſtations, or to bring the wound to ſuppuration.

During this time many ſymptoms intervened; as a continual fever with frequent paroxyſms; ſometimes a tenſion in the belly; at other times, a ſimple inflation only; ſometimes obſtinate coſtiveneſs, from the ſecretions not being duly made; at other times, *diarrhœas* from irritation, with *nauſeas* and vomitings. All theſe, however, were at laſt abated by bleeding, and other remedies, as the ſeveral ſymptoms required.

In ſhort, on the twenty-ſecond day, I ſeparated ſome part of the incruſtations, and in four or five days more removed all that were within reach; but the parts from whence I had taken them were black, hard, and looked as if cauſtics had been applied to them which had produced eſchars.

All theſe kinds of eſchars fell off by degrees, and occaſioned ſo many wounds that required dreſſing; and, during ten or twelve days, a great many of the ſtony incruſtations attached to pieces of membranes which had ſeparated from the inſide of the wound, alſo from the neck of the bladder, and perhaps from its internal cavity, diſcharged through the wound in *perinæo*. The wound at laſt became like other common wounds; but the patient was three months under my care before he was quite well.

No other method, therefore, can be depended upon but the operation of lithotomy; by which we may extract the ſtone, unleſs it be of a monſtrous bigneſs, and likewiſe promiſe a cure, provided the patient is compoſed in his mind, and the operation well performed; or unleſs the caſe be attended with any of thoſe bad circumſtances beforementioned, which ſcarce leave any hopes of recovery.

In order to perform the operation ſucceſsfully, the patient muſt be prepared as will be directed hereafter.

Of the proper time for the operation.

The public, who are always guided by prejudice in things that they do not underſtand, imagine we ought never to cut for the ſtone, but in

in the two temperate ſeaſons, ſpring and autumn; and they are led into this opinion from the practice of the hoſpitals, where they chuſe theſe two ſeaſons, which authors have termed the times of election. But there is this difference between a ward in an hoſpital and the chamber of a patient who can be provided with every thing neceſſary; that in the latter we can make the ſeaſon, and in the former we cannot.

There is alſo a time of neceſſity, and that is when the pains are violent; for, whilſt we wait for a temperate ſeaſon, the ſtone grows larger, the bladder becomes diſeaſed, and the patient ſinks under his complaints. The only objection, as to time, is in the intenſe heats of ſummer, which may render the operation improper, on account of weakening the patient; but as to any other time, I can truly affirm, that, by keeping the chamber warm, I have frequently cut patients in hard froſts, who have done perfectly well, nor has the ſeaſon been any ways prejudicial to them.

Of preparations for the operation.

If a patient that has the ſtone, and has determined upon being cut, is troubled with nephritic pains, we muſt wait till theſe are over before we proceed to the operation; and even till the ſmall ſtones that occaſioned them are got into the bladder. It would be very unfortunate to have freſh ſtones fall down there after the large one had been extracted, which yet might happen, even before the wound was quite healed. In ſuch a caſe, the patient would be to be pitied, and the ſurgeon would be accuſed of having left a ſtone in the bladder, which, in reality, came there after the operation.

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To prevent this misfortune, the patient ſhould be blooded once or twice, and for ſome days ordered to take emollient and diuretic draughts, in order to bring away with the urine the little ſtones that lodge in the kidneys. At the ſame he ſhould frequently be put into baths of a moderate warmth, to relax the parts, that they may more eaſily ſuffer the ſmall ſtones to paſs, which the urine brings along with it. But whether this be the caſe or not, it will be equally proper to bleed and purge the patient once or twice, according to the fullneſs of his conſtitution, and as his ſtrength will permit; enjoining him alſo an emollient, relaxing diet.

The evening before the patient is to be cut, a clyſter ſhould be injected, to empty the *rectum*, which, if full of groſs excrements, might occaſion ſome inconvenience during the operation. The *perinæum*, *ſcrotum*, and the circumference of the *anus* ſhould be ſhaved, and a proper place provided for the operation to be performed in. This done, there muſt be a firm table of a convenient height for the operator, and upon it a chair placed, the upper part of which ſhould be turned downwards, ſo as to lie aſlaunt, and make a ſupport for the patient's back; and it ſhould alſo be put ſo, that the edge of the table may reach beyond the end of the chair, more or leſs, according to the ſize of the patient. The whole muſt be covered with a quilt that juſt reaches to the edge of the table, and over that a ſheet: all theſe muſt be faſtened together with cords, ſo as nothing can be diſplaced. The back of the chair might likewiſe be placed in the ſame manner at the foot of a bed. Every thing being thus prepared, we proceed to the operation.

Of the manner of cutting for the ſtone in men.

THE art of ſurgery, ever employed in finding out the ſafeſt and eaſieſt means of cure, has been frequently engaged in endeavours to improve this operation; and the ſituation of the bladder, which may be opened either at its *fundus* or its neck, has ſuggeſted different methods of performing it; ſuch as the *apparatus minor*, the *apparatus major*, the lateral operation of Mr. *Cheſelden*, and that of Monſ. *Rau*. There may likewiſe have been ſome others, which, as I do not propoſe to compare one manner of cutting with another, would be needleſs to mention.

THESE four methods, which I have deſcribed in the *Parallel* publiſhed by me in 1730, have ſtill varied in the hands of thoſe who have practiſed them; every one having either added to, or retrenched from them, according as his judgment directed him, in order to render them more perfect. I ſhall ſay no more here of theſe different operations, the advantages and inconveniences of which I have already demonſtrated; but ſhall only deſcribe the manner in which I have performed the operation for ſome years paſt, and which I have fixed upon preferably to any other, as it has always proved ſucceſsful, even in the extraction of the largeſt ſtones. From this repeated ſucceſs we may at leaſt infer, that it is as little liable to inconveniences as any other method.

EVERY thing being ready for the operation, the patient muſt be put into a convenient ſituation for the ſurgeon, and be faſtened there, that he cannot move. In order to this, he is to be placed upon the table, prepared as before directed,

with

with his buttocks even with the edge of the table, his back leaning againſt the back of the chair, and his head ſupported by pillows.

Two aſſiſtants raiſe up his knees, and faſten his hands and feet with ligatures. The ligatures which I uſe are very convenient, as they are ſoon put on, and as readily taken off again without hurrying the patient, who, indeed, from the fear he is under, is not always ſenſible of their being applied; and they likewiſe ſecure the patient as effectually as the large ligatures uſed at the hoſpitals, which are deſcribed in the *Treatiſes of Lithotomy*. Each of the two ligatures is a tape made of ſtrong thread, two inches broad, and about two feet long, the two ends of which are joined together by a ſeam, in ſuch a manner as to deſcribe a circle. The tape being thus doubled, the ligature is but a foot long. A ſlip knot, made of ſuch another tape, brings together and joins the two ſides of this ligature, which then forms a ſort of figure of eight. This knot is not fixed, but may be moved towards either end of the ligature. Each of the aſſiſtants paſſes one of the patient's hands into one end of the ligature, and faſtens it with the ſlip knot at the bending of the wriſts; which done, he paſſes the other end of the ligature under the foot like a ſtirrup. He then puts one of his hands between the patient's arm and his ham to bear it up, while with the other he holds his foot.

The ligatures being thus applied, I introduce the ſtaff into the bladder in the ſame manner as was before directed, and feel for the ſtone. The two aſſiſtants before-mentioned keep open the patient's knees, whilſt a third ſtands on one ſide of him upon a chair. I then raiſe up the *ſcrotum*, and

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directing the laſt aſſiſtant to ſupport it with both hands ſo as to avoid bruiſing it by preſſing it either againſt the ſtaff or the *os pubis*, I place his two fore-fingers on each ſide of the part where the inciſion is to be made; one of the fingers being laid exactly along that branch of the *iſchium* which riſes towards the *pubis*, and the other preſſed upon the *raphé*, that the ſkin may be kept fixed and tight. Whilſt I thus place the fingers of the aſſiſtant who ſupports the *ſcrotum*, I ſtill keep hold of the handle of the ſtaff, and direct it ſo as to form a right angle with the patient's body, at the ſame time taking care that the end of it is in the bladder. This poſition is the more eſſential, as all the other inſtruments are to be conducted along the groove of this. If the handle of the ſtaff was kept inclining towards the belly, the end of it would come out of the bladder; and the *gorget* miſſing its guide, would ſlip between that and the *rectum*.

THE ſtaff being rightly placed, I take the knife from the aſſiſtant who holds the inſtruments, and put it into my mouth; then preſſing the beak of the ſtaff againſt the *rectum*, I feel the curvature of it through the *perinæum*. The inciſion ought to terminate an inch and a half below where we feel the bottom of the curvature. If we do not carry this inciſion ſufficiently low, it may happen not to be of a ſize to allow the extraction of a large ſtone, and might lay us under a neceſſity of extending it further afterwards, for the ſkin will not lacerate here, nor eaſily give way for the paſſage of the ſtone. I therefore begin the inciſion from the lower part of the *os pubis*, continuing it down to the place that I before directed for its termination; after which, I paſs the point of

of the knife into the groove of the ſtaff, and cutting from below upwards, without taking the point out of the groove, I open the anterior part of the *urethra* as far as the inciſion that is in the ſkin.

The beak of the ſtaff, which was preſſed upon the *rectum*, muſt now be raiſed and preſſed againſt the *os pubis*. At the ſame time I turn the handle towards the right groin, that the groove which is at the beak of the ſtaff may face the ſpace between the *anus* and the *tuberculum iſchii* on the left ſide; then carrying the point of the knife down the groove, I ſlide it along the beak, turning the edge that it may face the ſpace between the *anus* and the *tuberculum*. By this inciſion I exactly divide the bulb of the *urethra*, and by doing this on its ſide, we are ſure to avoid wounding the *inteſtinum rectum*, which for want of this precaution has been often cut. This firſt inciſion being made, I again paſs the point of the knife into the curvature of the ſtaff to the part where it bears againſt the *perinæum*, and direct it to be held there by the aſſiſtant who ſupports the *ſcrotum;* this done, I take a large *director*, the end of which is made with a beak like that of the *gorget* (ſee *fig*. 1.); and conveying this beak upon the blade of the knife into the groove of the ſtaff, I draw the knife out. I then ſlide the beak of this *director* along the groove of the ſtaff into the bladder, and I withdraw the ſtaff by turning the handle towards the patient's belly. The following circumſtances will ſufficiently ſatisfy us that the *director* is introduced into the bladder; firſt, if it ſtrikes againſt the end of the ſtaff which is cloſed; ſecondly, if the urine runs along the groove. I next feel for the ſtone with this *director*, and having found it,

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endeavour to diſtinguiſh its ſize and ſurface in order to make choice of a proper pair of *forceps*; that is, one of a ſtronger or weaker make, or of a large or ſmall ſize, agreeable to that of the ſtone; after which I turn the groove towards the ſpace between the *anus* and the *tuberculum iſchii*, and reſting it there, convey a biſtory along the groove, ſhaped as in *fig.* 2. the blade of which is half an inch broad, and about three quarters of an inch long. I continue the inciſion made by the knife in the *urethra*, and intirely divide the proſtate gland laterally, as alſo the orifice of the bladder; and I am very certain that the introducing the uſe of theſe two inſtruments, which are not employed by other lithotomiſts, does not prolong the operation a quarter of a minute, but rather ſhortens the time, both by facilitating the dilatation that is afterwards to be made with the finger, and by rendering the extraction of the ſtone more eaſy. The biſtory being withdrawn, the groove of the *director* ſerves to guide the *gorget* into the bladder; I then introduce my fore-finger along the *gorget* (which is now eaſily done, as the *urethra* and *proſtatæ*, being divided, do not oppoſe its entrance), and with it I dilate the paſſage for the ſtone, in proportion to the ſize of which I diſcover it to be. This dilatation being made, I withdraw my finger, and uſe the proper *forceps*.

I HAVE taken no notice of this beaked *director* in my *Parallel of the different methods of cutting for the ſtone*, having invented this inſtrument ſince that treatiſe was printed; but I find great advantages in the uſe of it. Firſt, it ſlips very eaſily to the end of the ſtaff, which the *gorget* will not always do without difficulty, in thoſe patients whoſe *proſtatæ* are very large, ſo that we are

more

more certain of conveying this into the bladder. Secondly, it is not ſo large as the *gorget*, and conſequently has a freer motion in the neck of the bladder, by which we are better enabled to diſcover the ſituation, ſize, and ſurface of the ſtone. Another advantage is, that it ſerves to conduct the inſtrument ſafely wherewith we divide the *urethra* and the proſtate gland, which cannot be performed by the common knife, becauſe the ſize of it will not admit of its being carried far enough into the bladder.

NEITHER have I mentioned this inciſion in my *Parallel*, as I did not at that time practiſe it: but I have there obſerved, that whatever inciſion is made, in what is called the *apparatus major*, a part of the *urethra* and the *proſtatæ* remain intire; that theſe muſt neceſſarily be lacerated by the introduction of the finger; and that the finger ſhould be introduced very cautiouſly, as well to prevent injuring the wounded parts, as to avoid, as much as poſſible, giving pain. But as it is neceſſary that the whole paſſage ſhould be opened, from the end of the firſt inciſion to the orifice of the bladder incluſively, it is much better done by inciſion than laceration: beſides, a ſtone of a middle ſize cannot be brought away without lacerating the inner ſurface of the proſtate gland on one ſide, if not on both, and occaſioning a conſiderable contuſion, as may be ſeen in the caſes related in the *Parallel* before-mentioned. It is better therefore to divide it by a proper inciſion, as this will certainly be attended with leſs pain than lacerating it. Add to this, if on account of extracting a very large ſtone the parts muſt neceſſarily ſuffer a laceration, that which follows the inciſion I have propoſed, only renders the opening of the

wound

wound larger, and occaſions much leſs contuſion of the *proſtatæ*. The inciſion, in this caſe directs the laceration, which otherwiſe is always made with great contuſion and irregularity.

Another advantage we derive from the inciſion, and which cannot be known but by performing the operation, and comparing it with other methods, is the eaſe with which the finger is introduced, and the paſſage dilated. Before I uſed this inciſion in the *urethra*, and the *proſtatæ*, I often found great difficulty in repreſſing with the finger, the reſiſtance of the neck of the bladder, which is inveſted by the *proſtatæ*; and when they were large and hard, as they ſometimes are, I did not, perhaps, get the better of it without injuring the tendons of the bladder, and the membranous part of the *urethra*, which alone ſuſtained all the efforts of the finger in preventing the neck of the bladder's being forced towards its *fundus*; but by making the inciſion in the *urethra* and the proſtate gland, the difficulty of introducing the finger into the bladder is removed.

By means of the *gorget* I paſs a proper pair of *forceps* into the bladder from below upwards, following the arch made by the *os pubis*; and moving them along gently, to prevent puſhing againſt the *fundus* of the bladder, which, by the urine being all run out, is brought near the neck, I introduce them till the rivet that joins the two branches reaches the orifice, and then I withdraw the *gorget*. If the bladder is pretty large, as it almoſt conſtantly is when the ſtone is not very big, and if at the ſame time the ſtone preſents itſelf well, we eaſily get hold of it; but we muſt not attempt to make the extraction till we have lodged the ſtone in the middle of the claws. We may judge how

how it is taken hold of, that is, with which ſide of the *forceps*; but if our hold is not fixed upon the middle of the ſtone, we ſhould place the *forceps* in ſuch a manner that the two claws may reſt together upon that part of the bladder which bears upon the *rectum*, and then opening them a little, we may expect that the ſtone, by its own weight, will fall down and lodge itſelf between the claws. Having ſecured it in this ſituation, we are not under a neceſſity of preſſing hard upon it in the extraction, and conſequently run leſs hazard of breaking it.

If a ſtone of a middling ſize ſlips from between the *forceps*, by the convulſive motion of the bladder, which being in pain, may occaſion it to ſhift its ſituation at the very moment we thought ourſelves ſecure of taking hold of it, we muſt open the *forceps*, and make ſeveral half turns alternately with the two claws, ſliding along that part of the bladder which lies upon the *rectum*. This is the ſureſt way of making the ſtone fall into the claws, and we frequently find, if we bring the claws near each other at every half turn, that the ſtone is got between them. If the ſtone is large, the bladder is generally callous; in which caſe it embraces the ſtone as one would with a hand, ſo that it cannot be laid hold of but at one of its extremities, the bladder itſelf preventing us from conveying the *forceps* far enough upon the ſtone to take a proper hold of it without running the riſk of pinching up the bladder with it. When this caſe happens in children, we muſt withdraw the *forceps*, introduce the fore-finger into the bladder, diſengage the ſtone, bring it with the finger near the neck, then paſs in the *forceps* again and extract it.

If it is a grown perſon, we can introduce the finger no farther than the neck of the bladder, and therefore cannot by that means diſengage the ſtone as in a child; but in this caſe we muſt gently open the *forceps*, in order to ſeparate the ſides of the bladder, ſo as to allow ſufficient room for them to play. This done, we are to take hold of the ſtone in the beſt manner we can with the end of the *forceps*, and, without attempting to extract it, make two or three half turns on both ſides to diſengage it from the bladder which embraces it, and then draw it a little out of its ſocket: when it is thus diſengaged, we muſt advance the claws of the *forceps* upon the ſtone by opening them a little, and get ſuch hold of it that it may not eſcape.

As to thoſe ſtones that are found in bladders, which, as we have before obſerved, ſeem to be divided into two by a contraction in that part where the *ureters* are inſerted, they are ſometimes exceeding difficult to be got hold of: a large ſtone may be lodged in the anterior part of the bladder, and be exactly incloſed there as in a *cyſtis*. In 1727, I performed the operation on a man of forty years of age in *La Charité*, who had a ſtone ſituated in this manner, which weighed eight ounces. The *forceps*, being introduced, got under the ſtone, the inciſion of the *urethra* being made near the *rectum*, and prevented me from taking hold of it; and very probably, in opening the *forceps*, which I did with difficulty, and after ſeveral attempts, the neck of the bladder and the intermediate part as far as the contraction were lacerated: fortunately indeed the patient was pretty lean. The loſs of ſubſtance which this had occaſioned, afforded room to introduce the fore-finger

ger from below upwards, between the ſtone and that part of the bladder which is connected to the *os pubis*, and, by the help of the finger, I paſſed in a pair of crooked *forceps*. This done, I opened them, laid hold of the ſtone, diſengaged it from its ſocket by ſeveral motions, and extracted it. Notwithſtanding the great loſs of ſubſtance in that part of the bladder which is connected to the *rectum*, the patient recovered; yet I think, in ſuch caſes, it would be more adviſeable to open it by an inciſion continued from that of the *urethra* and the neck of the bladder. If the ſtone ſhould be in the *fundus* of the bladder, beyond the contraction, and it cannot be taken hold of even with a crooked pair of *forceps* (ſuppoſing the patient ſo young or lean as to allow us to feel with the finger the contraction that conceals it), I ſee no inconvenience can ariſe in dividing it ſideways to a certain degree with a biſtory, introduced upon the finger, and ſharp only towards the point. This done, the ſtone may be laid hold of with the *forceps*, and be eaſily extracted.

As to thoſe ſtones that are lodged in cells, it is impoſſible to take hold of them while they continue there.

Having thus given an account of the moſt proper means of laying hold of the ſtone in different circumſtances, I acknowledge it is entirely from practice that I have learnt the methods I have here ſuggeſted, and indeed it is by that only a man can be enabled to ſpeak of this matter with certainty. Thoſe who apply themſelves to this operation, may be ſome years before they can be taught theſe methods by their own experience, and perhaps at the expence of

their patients. I have seen some operators who have immediately seized the stone as soon as they touched it with the *forceps*, and have endeavoured to extract it directly; but if it is embraced by the bladder, as some are, they may happen to pinch up that at the same time, which would produce an inflammation there. If the stone does not present itself immediately, they are a long while in searching for it, and by that means may probably injure the bladder very much. If they press hard upon it for fear it should escape out of the *forceps*, they break it. If they have hold of it at one corner only, it slips from the *forceps*, which are drawn away without it, and must be introduced again. The extraction of the stone, therefore, ought never to be attempted till we are sure the stone lies right between the claws of the *forceps*. I thought it incumbent upon me to lay a stress upon this, as I have been taught the great consequence of it by experience.

Nor is the proper manner of extracting the stone of less importance than the method of taking hold of it. When we have got a proper hold, we must turn the claws of the *forceps* in such a manner that one of them may face that part of the *urethra* which passes under the *os pubis*, and the other claw the part which passes over the *rectum*; for it is better to pass the polished surface of the *forceps* that way than to draw out the sides of the stone there, which perhaps may be very uneven and rough.

So likewise, in making the extraction, we must press against the *rectum*, in order to avoid injuring the arch of the *os pubis*, which cannot give way to the bulk of the stone; and that it may come out with less difficulty, we must withdraw the

the claws of the *forceps*, by little and little, one after the other; that is, we must gently move one of the claws by drawing and inclining the branches of the *forceps* downwards, and then move the other claw by raising the branches upwards, and thus alternately till the stone be brought out. If we endeavour to extract the stone either by drawing it out in a straight line towards us, or by turning the claws and stone from one side to the other, as some lithotomists do, we should occasion such a loss of substance throughout the wound by the inequalities of the stone, as would very probably bring on an inflammation in four and twenty hours.

NOTWITHSTANDING all the care an operator can take to avoid breaking the stone, it is possible such an accident may happen from the softness of its texture. If he finds it break, he should open the *forceps*, which by pressing upon it might crumble it into very small pieces; for it is better to let it remain in such bits as are easily taken hold of and extracted directly, than reduce it into lesser parts which might afterwards slip away from the *forceps*. If we could be so lucky as to reduce it to sand, or a soft consistence, it would all come away very readily with the urine; but this is impossible, and some fragments would always remain behind. Besides, the patient is uneasy till he sees the stone, and quite unhappy if he finds it is not intirely extracted: And yet, though nothing but bringing away the stone will satisfy the patient, or render the operation perfect, it is sometimes better to leave it than to hurt the bladder by many fruitless attempts. In five or six days time, it may be easily brought away, as it will then present itself at the neck of

the bladder, being drawn thither by the urine, or by a kind of *mucus* which ouzes from the internal coats of the bladder.

What I have propoſed is as much with a view to ſecure the bladder from any injury as to lay hold of and extract the ſtone methodically, for the bladder itſelf deſerves our utmoſt care and attention. The bladder, by being irritated to a certain degree, eaſily becomes inflamed, and this inflammation may end fatally. If therefore the operator's reputation depends upon extracting the ſtone, it depends yet more upon the recovery of the patient: for what would be thought of a lithotomiſt, who never failed to bring away the ſtone, but whoſe patients, ſoon after the operation, all died of an inflammation?

The firſt thing to be done, as ſoon as the ſtone is extracted, is to examine its ſurface, and if there is part ſmoother than the reſt, it is owing, as was before obſerved, to its being worn by rubbing againſt ſome other ſtone: if it is ſmooth on more than one ſide, it is an indication of there being more than two ſtones.

We ſhould immediately therefore introduce the button probe, ſearch for the ſtone, and having found it, convey a proper pair of *forceps* along the ridge of that inſtrument, then lay hold of the ſtone, and extract it: the ſame method muſt be repeated either if there are ſeveral ſtones or ſeveral pieces of one large ſtone that is broke.

If the ſtone that is extracted is uneven in its whole ſurface, it is certainly ſingle, and we need not ſearch the bladder any more.

Of the use of the canula.

THERE are three circumstances which may happen in this operation, that will make it proper to leave a *canula* in the wound; one end of which *canula* should be introduced into the bladder a little beyond the internal orifice of the wound, whilst the other remains even with the skin of the *perinæum*.

AND first, when the bladder is callous: in which case its internal coats will suppurate for some days; and when the wound begins to come into that state, it would be proper to make injections. The *canule*, therefore, will serve to keep the passage open; and when it is proper to inject, it may be done through the *canula*, or, which will be easier introduced, the female *catheter*. Secondly, the lodgment of a stone in the bladder that could not be extracted, or of some fragments of a broken stone. If we do not pass in a *canula*, the lips of the wound are apt to close too soon; and when the suppuration begins, which is the time that the stone may be extracted, it would be very difficult to introduce the instruments into the bladder, or at least they would be subject to give great pain to the patient; whereas if a *canula* has been used, you need only draw it out when the suppuration is come on, and as by its continuance in the wound it has preserved a passage for the instruments, the extraction will consequently be more easy. A case will in a short time be published in the *Memoirs of the Academy of Surgery*, of a stone which, being lodged in the *ureter*, advanced only one third of an inch into the bladder. The extraction could not be

made till ſeven weeks after the operation, and though nature is always inclined to cloſe the wound and the neck of the bladder, yet I kept them ſufficiently open all that time to introduce the *forceps* eaſily. The method I therein obſerved, will be mentioned in its proper place. To conclude, the third reaſon, to continue a *canula* in the wound, is the hæmorrhage that may enſue from the operation. The veſſels whence the blood flows are not always ſo ſituated as to be diſcovered, and conſequently neither a ligature can be made nor any ſtyptic applied.

I HAVE often ſeen this hæmorrhage proceed only from a laceration cauſed by a large ſtone in its extraction, and I have never failed of ſtopping it with a middle-ſized *canula*, covered with rag and ſprinkled over with colophony. When this is rightly placed, it preſſes againſt the ſides of the wound throughout its whole extent, and the ſides of the wound preſs againſt that, ſo that the blood not being able to paſs eaſily out of the wound, nor be received into the bladder, coagulates, and forms a clot round the *canula*; which clot, as ſoon as it has begun to form, extends itſelf to the mouths of all the opened veſſels, and the blood itſelf choaks up its own paſſage. Again, as the orifice in the *canula* affords a free courſe for the urine that comes from the bladder, it can neither moiſten nor force away the clot in paſſing, and the hæmorrhage, however violent, is found by this means gradually to abate, and at laſt intirely to ceaſe.

IN 1733, I performed the operation upon a very large man of forty years old, and extracted a ſtone of a conſiderable ſize. There was no hæmorrhage appeared at the time of the operation

ration, and as the ſtone was ſingle and the bladder ſound, I did not chuſe to introduce a *canula*; but on the ninth day, a hæmorrhage came on, and the lips of the wound being almoſt cloſed, I could not diſcern from what part it proceeded. This prevented me from putting a *canula* into the wound at that time, and therefore I only paſſed in a tent, which ſtopt the blood; but as the tent obſtructed the courſe of the urine, it ſoon became neceſſary to remove it. And an hour or two after, the hæmorrhage broke out again, the urine having waſhed away the coagulated blood; upon this I introduced the female *catheter* into the bladder, and left it there, ſecuring it with the bandage that it might not ſlip out. I likewiſe bound together the patient's knees, by which means I kept the lips of the wound near each other, ſo that the *catheter* was in ſome meaſure compreſſed and fixed there. The blood coagulated again, and the urine paſſing through the *catheter*, it was not afterwards waſhed away, but the hæmorrhage ſtopt intirely. The *catheter* was removed only once in every ſeven or eight days.

In order to introduce a *canula* at the time of the operation, we muſt paſs a finger up the wound into the bladder, then convey a *gorget* along the finger, and by the help of that introduce the *canula*. If we were to attempt doing this without the *gorget*, the extremity of the *canula* might happen to make itſelf a wrong paſſage between the lacerated fleſh, and not enter at all into the bladder. In which caſe it would occaſion a great deal of pain to the patient, and not anſwer the end propoſed in paſſing it, but on the contrary would become an extraneous body, and might be productive of bad conſequences.

The operation being finiſhed, the wound ſhould be covered with a very thick compreſs, the ligatures taken off, and the patient put into a warm bed, with his knees brought cloſe together.

To conclude, the regular application of the dreſſings, and the proper treatment of the patient afterwards, are circumſtances as neceſſary to be obſerved as any that regard the performance of the operation.

Of the dreſſings.

It will be proper to leave the patient about half a quarter of an hour without dreſſing his wound at all, that the veſſels may have time to diſcharge themſelves. After this, the coagulated blood, which will collect round the orifice, muſt be wiped away, but that which is deeper in the wound ſhould remain, ſince it is by theſe clots of blood that the hæmorrhage is to be ſtopt; and they will be liable to be looſened too ſoon by the diſcharge of the urine: it would alſo be proper to leave a doſſil or two of lint between the lips of the external inciſion, in order to keep in this coagulated blood, and preſerve the lips ſeparate; applying upon theſe the pledgets and compreſſes. The *ſcrotum* muſt be covered and ſupported by a large ſquare or triangular compreſs, which we call a truſs, and the whole kept on by a bandage in the form of a double T. This bandage has two ſtraps, which go off from the girdle or circular part at the loins, and being brought back towards the wound, croſs each other upon it, and paſſing up on each ſide of the *ſcrotum*, are faſtened at the forepart of the girdle.

The

THE girdle or circular part is ſupported, and thereby prevented from falling down, either by a ſcapulary, collar, or ſhoulder ſtraps; the laſt of which is much the moſt convenient, and leſs troubleſome to the patient.

THE belly, particularly about the region of the bladder, ſhould be embrocated with oil of roſes, and covered with a flannel dipt in an emollient fomentation made very warm; and in order that this flannel may not wet either the patient or the bed, it ſhould be wrung out ſo as only to retain its moiſture and heat. The embrocation and fomentation muſt be repeated every two hours during the two or three firſt days; and as in theſe caſes the urine paſſes through the wound and wets the dreſſings, freſh muſt be applied at leaſt twice a day.

WHETHER you put a *canula* into the wound or not, the dreſſing ſhould be of the moſt ſimple kind till the third or fourth day, placing between the lips of the external wound one or more threaded doſſils, dipt in common digeſtive; upon theſe a pledget armed with the ſame digeſtive, the compreſſes and truſs ſteeped in brandy, and the whole kept on by the bandage beforementioned. If we ſhould attempt to dreſs the bottom of the wound, by introducing a doſſil there, we might probably bring on an hæmorrhage; beſides, it will be hardly poſſible to do this, for the operation always occaſions a ſwelling in the lips of the wound, and the parts that have ſuffered. But when the ſuppuration is procured, the ſwelling abates; and the bottom of the wound may then be dreſſed with different applications, according as the *canula* has or has not been introduced.

If

If no uſe has been made of a *canula*, we muſt convey a doſſil to the bottom of the wound, faſtened to a long thread, to prevent its paſſing into the bladder, or elſe apply a tent of a ſufficient length, and tied as the other. This precaution of ſecuring the tent or doſſil is very material. In 1732, I cut a child of eight years of age, who had undergone the operation three years before, and the ſtone which I extracted had formed itſelf upon a ſmall doſſil at its *nucleus*, which undoubtedly had ſlipped into the bladder from the former dreſſings. This doſſil or tent ſerves only to convey proper medicines to digeſt the ſloughs formed at the bottom of the wound, and in proportion as the ſwelling abates, and the ſuppuration encreaſes, we may paſs them farther up. They ſhould likewiſe be made very ſmall, for as they will enlarge by the ſoaking of the urine, they might otherwiſe be liable to obſtruct the paſſage of it.

When the ſloughs are looſened, which generally happens about the tenth day, we muſt leave off digeſtive medicines, and dreſs the wound with detergents; ſoon after, truſting the bottom of the wound to nature, we are to do nothing more than dreſs ſuperficially with dry lint. When we find the ſuppuration abate, which is owing to the ſides of the wound gradually cloſing, we ſoon after perceive the urine return to its natural courſe. The patient himſelf is ſometimes not ſenſible of this, otherwiſe than as he diſcovers it by his belly and the bandage being wetted. But ſometimes he feels a ſort of tingling pain in the *penis* when the urine opens its paſſage through the *urethra*. The wound may then be looked upon as a ſimple wound, and will ſoon heal with common applications.

If

If a *canula* is introduced into the wound in order to ſtop the hæmorrhage, great care muſt be taken that it does not ſlip one way or the other, and that it does not come out; for its remaining there ſteady is abſolutely neceſſary to keep up the coagulated blood which ſtopt the hæmorrhage, as well as to afford a paſſage for the urine. Towards the fourth or fifth day it generally grows looſe, and, no longer adhering to any thing, may be eaſily removed; but great care ſhould be taken not to paſs any thing to the bottom of the wound, for fear of renewing the hæmorrhage: towards the ſeventh or eighth day the bottom may be dreſſed as was before directed.

If we have had recourſe to a *canula* on account of the bladder's having had a large ſtone lodged in it, and being thereby become callous, it will be proper for ſeveral days at each dreſſing to inject ſome emollient decoction; and this may be done by taking out the *canula* and paſſing the female *catheter* through the wound into the bladder.

When the matter comes away unmixed with *mucus* and glaris, it is a ſign the bladder is free from any thing of that kind, and therefore, continuing the dreſſings as was before directed, the uſe of the injections may be laid aſide.

If we have made uſe of the *canula* in order to facilitate the extraction of an entire ſtone, or the fragments of a broken one, which could not be brought away at the time of the operation, we muſt wait for the extraction till the wound comes thoroughly to ſuppuration, for if we ſhould attempt it ſooner, the ſwelling of the lips would obſtruct our deſign. The *mucus* of the bladder and the urine together ſeldom fail to bring the ſtone

ſtone or its pieces near the orifice; the *canula* may then be taken out, and by introducing the female *catheter* we generally find them near the neck of the bladder.

If they are little pieces, we may introduce a pair of ſmall *forceps* or pincers, and take hold of them. If it is a pretty large ſtone, the patient muſt be placed on the ſide of his bed, with his knees raiſed and ſupported by two aſſiſtants, and then introducing a proper pair of *forceps* into the bladder, by means of the *gorget* or the ridge of the button-probe, we lay hold of the ſtone and extract it. If the ſtone does not preſent itſelf near the orifice, injections ſhould be made into the bladder by the female *catheter*, which will gradually bring it thither; and as ſoon as it can be felt with the *catheter*, it muſt be extracted.

As to gravel or very ſmall pieces, they paſs out with the urine, or are found in the wound or dreſſings. As long as there are any of theſe to come away, injections ſhould be thrown into the bladder at each dreſſing, and care taken to keep open the bottom of the wound with a tent, the ſmall end of which may enter quite into the bladder.

Sometimes an *ecchymoſis* affects the whole *ſcrotum*, making it appear of a deep red colour, and in ſome places very black. This particularly happens when a *canula* has been put in, to ſtop the hæmorrhage; whence it ſhould ſeem that the blood, not being able to make itſelf a way outwardly, had diffuſed itſelf throughout the whole adjacent cellular membrane. This *ecchymoſis* diſappears gradually by dipping the truſs that ſupports the *ſcrotum* into brandy, and by the warmth preſerved there by the fomentations.

Of

Of abſceſſes which ſometimes follow the operation.

WHEN the operation has been difficult, and there has been a neceſſity of introducing the *forceps* ſeveral times, an inflammation has ſometimes ariſen, and has been followed with ſuppurations in the cellular ſubſtance about the *perinæum* and round the bladder. Theſe ſuppurations cannot be formed without exciting a fever, and many other ſymptoms. It depends therefore upon the ſurgeon's judgment to treat them differently, according to the parts where theſe ſinuſes are formed, either by opening them with a biſtory or dilating them with a doſſil, in order that the matter may have a free paſſage through the wound.

WHEN the *ſcrotum* has been bruiſed, or too much compreſſed, by the aſſiſtant who held it up during the operation, there uſually enſues an inflammatory ſwelling, and ſometimes ſuppurations, the matter of which, being formed between the *ſcrotum* and the *os pubis*, runs along the *urethra* by the upper angle of the wound. But though the *pus* diſcharges in this manner pretty readily, yet it is ſometimes neceſſary to make an inciſion, in order to give it ſtill a freer vent; but in doing this, care muſt be taken not to cut the *urethra*. To diſcover the ſituation of this part the better, which the ſwelling of the *ſcrotum* may render difficult, it will be proper to introduce a ſmall *bougie*, which will enable us to diſtinguiſh it by its reſiſtance.

FREQUENTLY this inflammation of the *ſcrotum* degenerates into a *phlegmon*, producing one or more abſceſſes in the *ſcrotum*. If theſe cannot be prevented by reſolvent cataplaſms, they muſt be opened

opened as soon as the *pus* is formed. When the wound is become simple, it soon heals by common applications, but it will be proper to confine the patient to his bed a week after the wound is quite healed, to let the *cicatrix* consolidate, which might otherwise be liable to open as he walked; and if he is allowed to rise even at the expiration of that time, his knees should be still secured together for several days, in order to prevent his separating them either by walking or some other accident; for the *cicatrix*, once broken, is very difficult to be formed again.

Of the manner of cutting women.

THE same preparations as were directed for the operation in men, will be necessary upon this occasion. The single difference that arises is in reference to the *menses*, which require us to perform the operation during the interval between them.

THE posture in which the woman is to be placed is the same as that of the man; her feet and legs must be supported in the same manner, and fixed with the ligatures beforementioned.

WHEN a man has the stone it is very difficult to know before the operation, what is the consistence, size, and surface of it; not only because the *catheter* enters but two or three inches into the bladder, but likewise because the curve described by the *urethra* in its passage prevents the free motion of the instrument; but the thing is easy in women, for as the *urethra* is straight, and also the *catheter* that we make use of, we may introduce it as we please, and move it about in the bladder in different directions, in order to feel the stone,

and

and to discover what kind of one it is; and hence we are to be determined in the manner of performing the operation.

WHEN the stone is small, or of such a moderate size as not to exceed the weight of an ounce or two, we should avoid making any incision, and rather imitate nature as much as possible, who to facilitate the passage of the child through the neck of the *uterus*, dilates it gradually by means of the throws and labour-pains. We must observe therefore to dilate the *urethra*, and the neck of the badder in the same manner, without forcing them too much; and in order to this, we first introduce the staff, which after serving to guide the beak of the *gorget* into the bladder is immediately drawn out. The *gorget*, which is larger than the staff, begins the distension of the *urethra*, and the neck of the bladder; and by means of this we introduce a small pair of *forceps* made for children; so that the bulk of this added to that of the *gorget*, encreases the dilatation, and with very little pain. We then draw out these *forceps* and pass in a larger pair, in order to make the distension still greater; and thus we proceed successively till we can introduce a pair of *forceps* of a suitable size to that of the stone. This alternate introduction of the *forceps* employs perhaps about two minutes, but the delay is very inconsiderable when compared with the advantages arising from it.

AFTER this we draw out the *gorget*, and endeavour to get hold of the stone in the maner before directed, extracting it also with the same precautions. I have performed the operation in this manner on some women, who with the application only of a fomentation to the inside of the *vulva*, have been cured in less than a fortnight,

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and at the end of that time have been able to retain their water.

The operation is not so simple if the stone is large, the *urethra* and neck of the *uterus* not admitting a sufficient distension to let it pass. In this case an incision must be made as in men, or a dreadful laceration might ensue, which would necessarily be succeeded by an incontinence of urine, even supposing the patient survives the inflammation.

When the staff is introduced into the bladder, we turn the groove in such a direction as to face the interval between the *anus* and the *tuberculum ischii*, in order to make the incision on that side, and a finger being introduced into the *vagina*, serves to direct this groove so as to prevent the cutting the *vagina*, which is to be avoided with the same care as injuring the *rectum* when we perform the operation upon men. This done, we pass the small bistory abovementioned along the groove, beyond the neck of the bladder, and immediately draw it back again, and thus the neck of the bladder and the *urethra* are divided. We are then to pass a finger along the *gorget* quite into the neck of the bladder in order to open and dilate the whole passage as much as possible; which done, we introduce a proper pair of *forceps*, take hold of the stone, and extract it. And thus the stone comes away without much difficulty, as there are no *prostatæ* here to obstruct its passage as in men, but only a cellular substance, which either tears or distends in proportion to the bulk of the stone. In all probability too, there is a laceration in the bladder, extending from the incision made at its orifice towards the body of it; but this could not be avoided, and would have happened

pened equally by the extraction of the ſtone, though no inciſion had been made, and might have proved, perhaps, more dangerous.

The dreſſings are not ſo ſimple as when a ſmall ſtone only has been extracted, ſince the parts that have been diſtended and lacerated will be apt to cloſe too ſoon at the circumference of the neck of the bladder; for which reaſon it will be proper to introduce a *canula*, and leave it in for four or five days, till the ſuppuration is perfectly formed.

The whole cellular ſubſtance that has been lacerated, and likewiſe that which has only ſuffered a diſtenſion, may inflame, and come to ſuppuration; in which caſe, the *canula* muſt be removed, and a tent armed with a digeſtive proper to haſten the ſuppuration be ſubſtituted in its ſtead. If the ſize of the tent obſtructs the courſe of the urine, a very ſmall leaden pipe may be incloſed within the tent to preſerve a free paſſage. When the ſuppuration abates, it is a ſign that the ſwelling of the whole circumference of the wound is gone off, and the tent may then be left out, applying only ſimple dreſſings.

I have known a conſiderable abſceſs formed on the internal ſurface of the left *os ilium* (which was the ſame ſide where the inciſion was made), that did not appear till above ſix weeks after the operation. The cellular ſubſtance round the bladder, which inflamed and came to ſuppuration, yielded a diſcharge through the wound for above eighteen days, but at laſt this ſuppuration intirely ceaſed, and the wound healed. A little while after there appeared a redneſs in the ſkin of the *abdomen*, and a hardneſs at the internal ſurface of the *os ilium*, four fingers breadth above the

bending of the groin. About a fortnight afterwards I felt a fluctuation which induced me to make an opening, when I discovered that the *pus* was formed in the cellular substance investing the bladder, for the bottom of the abscess extended to its neck.

If a *canula* had been introduced immediately after the operation, it is probable this abscess might have been prevented, by preserving a free passage for the matter which ought to have discharged through the wound a longer time.

The method of treating patients in this distemper.

It is not barely sufficient to have extracted the stone: we must take care likewise to prevent such symptoms as may be expected to arise, and to remove those which appear at present.

Some of these symptoms appear within four and twenty hours after the operation, others not till some days afterwards. Both the one and the other may proceed from the discomposure of the patient's mind, through the dread of the operation, from the pain that necessarily attends it, and from the inflammation which sometimes ensues upon it. But as the principal cause we must reckon the apprehensions of the patient at the approach of an operation where his life is concerned; apprehensions which greatly increase when the time of suffering draws near. I have seen many instances of people who have seemed by their discourse not only to be free from any dread of the operation, but even earnestly to desire it, and yet, upon entering the room where every thing was prepared for the performance, they have changed yellow as saffron. This alteration of colour is a certain proof of a very great

great revolution in the whole animal syſtem, and is owing probably not ſo much to an agitation as a violent contraction of all the elaſtic parts, by which the circulation is obſtructed, and many of the ſecretions may be thereby ſuſpended. Agreeable to this notion, I have known ſuch patients, during the eight or ten firſt days, affected with a variety of ſymptoms, as a fever, *flatus* in the bowels, coſtiveneſs, and in conſequence of that a diſtenſion of the belly; afterwards a *diarrhœa, &c.* ſymptoms that could not be attributed to the wounded parts being inflamed, ſince no inflammation of any conſequence had enſued.

The pain that is inſeparable from the operation, and which continues with more or leſs violence for above an hour, may occaſion the like ſymptoms; and in order to be convinced of this, we need only with a microſcope examine the effects which pain has upon an animal when wounded. We ſhall ſee that the fluids which paſs through ſome of its veſſels ſtop ſuddenly, and ſometimes return back, which certainly muſt be owing to a ſpaſmodic contraction or an antiperiſtaltic motion of all the fibres that compoſe theſe veſſels: And why may not pain produce the ſame effect on the veſſels of our bodies, and on the fluids that circulate in them? We ſhould not be ſurprized therefore to find ſuch accidents ariſe, ſince our health does not only depend upon the good quality of the animal juices, but alſo upon the regularity of their courſe, for we every day ſee that an irregularity in the circulation renders them diſeaſed. We may venture then to aſcribe the greateſt part of the abovementioned ſymptoms as juſtly to pain as to fear: the convulſive ſhivering which uſually comes on ſome hours after the operation, the ſlight inclination to vomit,

the continual faintings, and the inquietude and restlessness that affects the patient, must all proceed from the same cause.

To conclude; an inflammation of the parts affected may ensue in consequence of the operation's being ill performed, and sometimes indeed though done ever so well. This inflammation, which, beginning at the bladder, extends to the whole cellular substance that surrounds it, may reach to the *ureters* and kidneys. In which case those parts are affected with acute pains like those which the gravel occasions. If the inflammation extends to the *peritonæum* and the intestinal canal, it brings on an antiperistaltic motion of the intestines, attended with pains all over the belly and frequent *nauseas*; and if it still increases, a gangrene soon seizes on all the parts where the inflammation fixed itself. An increase of the fever, continual pains, and a swelling of the *hypogastrium* are the first symptoms; a tension of the whole *abdomen*, a hickup, and perpetual restlessness and vomitings soon follow; at last, the pulse becomes convulsive, the patient sinks, and soon dies.

Of all the symptoms beforementioned, that which strikes the by-standers least, and which nevertheless demands our greatest attention, is the spasmodic tension of the whole nervous system, which disturbs the order of the circulation, and may produce an obstruction; which obstruction is more to be apprehended, as the fluids, when once stopt, do not easily return to their natural course, and other obstructions, which may be formed in consequence of the former, may also degenerate into an inflammation. The inflammation, which sometimes after the operation seizes on the bladder, and the parts near the wound, is likewise

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a ſymptom which deſerves our utmoſt care to prevent, as its progreſs may be very quick. We every day ſee that the ſame remedy conduces to abate one of theſe ſymptoms, and to prevent the other. I have learnt by experience, of how great efficacy oils are to relax the ſpaſmodic and convulſive tenſion of the whole nervous ſyſtem; nor are their virtues leſs effectual in inflammations, eſpecially in thoſe of the *abdomen*. As ſoon therefore as the patient is laid in his bed, I order him to take between two and three ounces of oil of ſweet almonds. The greateſt part of this oil paſſing along the inteſtinal canal, lubricates the inteſtines, and by relaxing them may prevent their being irritated; at the ſame time it promotes the diſcharge of the *fæces*, for we generally find in a few hours the patient has ſtools. Whilſt part of the oil paſſes along the inteſtines, another part of it enters the lacteal veins, and mixes with the fluids: there it diſtributes itſelf to every part of the body, and abates the diſpoſition to tenſion. I repeat the ſame doſe about once or twice a day: And perhaps it is to this method I owe the ſucceſs of my operation.

Bleeding is alſo neceſſary and of great ſervice, but cannot always be immediately uſed. I have ſeen ſome patients, after the operation, continue for many hours in ſo weak a condition, that it was more neceſſary to think of raiſing their ſpirits and invigorating, than to lower them by bleeding. This weakneſs certainly did not proceed ſo much from the loſs of blood, ſince they had not loſt above three ſmall porringers, as from a ſpaſmodic tenſion in the whole body. It has been in theſe caſes that I have obſerved the convulſive ſhiverings beforementioned to come on ſometimes two or three hours after the operation,

or ever sooner; after which the pulse rises, and as soon as the shivering is over, I bleed the patient, repeating it, if necessary, in a few hours. An exact regimen and emollient draughts ought to be used for the same end.

If the bladder is in danger of an inflammation, we may discover it by the tension of the *hypogastrium*, which swells, and is painful when touched; if the intire *abdomen* is in danger, the tension soon seizes on the whole. In this case bleeding in a large quantity is proper; repeating it occasionally according to the patient's strength. The oil of sweet almonds should likewise be continued both as an emollient medicine, and as a laxative to procure an useful evacuation by stool.

If the symptoms are moderate, we find them gradually abate as the suppuration comes on. I do not mean here those symptoms which may appear several days after the operation; for as we cannot foresee what they will be, we cannot direct proper remedies, but in this case we are to consult what are the different curative indications. Supposing none arise when the suppuration is formed, yet we must not on that account be less strict in the regimen, not only because a patient, confined in his bed, requires less nourishment, as he has a less waste of spirits, but because the least indigestion might disturb the whole cure.

As lying in bed renders the belly costive, a clyster should be administered every two or three days, to carry off any excrements that might ferment in the intestinal canal; and sometimes a gentle purge should be given, to excite nature to throw off what might be lodged in the small guts, and which clysters, as they do not reach so far, cannot possibly bring away.

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Of Fiſtulæ *ſucceeding the operation.*

When the operation is performed, and the wound almoſt healed, a *fiſtula* may yet remain, through which part of the urine may paſs from the bladder: and this may proceed from various cauſes.

The thin and weak ſtate of the patient may be one reaſon, and this is often owing to his conſtitution; but the diſtemper, and the low diet to which he has been confined, may have contributed; in which caſe, we can hardly hope to heal the *fiſtula* till he has recovered his fleſh, and then, upon examining the *fiſtula*, we find its ſides are grown very hard and callous. I have cured ſeveral of theſe by putting a ſmall catheretic torch into them, which conſumed the calloſities, and the wound ſoon after cloſed. Care was taken in theſe caſes to keep the patients in bed, with their knees tied together, that they might not, by ſtirring, prevent the re-union.

The wound may likewiſe become fiſtulous, from a neceſſity of keeping it long open with a *canula* to preſerve a paſſage for any gravel or pieces of a ſtone that were broke off in the operation. This *fiſtula* may alſo be healed by the means before directed.

The third cauſe of a *fiſtula* is the dilatation of the neck of the bladder, which, not having contracted itſelf, cannot retain the urine; and it is obvious that as long as the urine paſſes through the wound, it not only waſhes away the nutritive juice which ſhould form the fleſhy granulations and the *cicatrix*, but it alſo hardens the fleſh in its paſſage, by the ſalts with which it is impregnated. We can-

cannot therefore hope to cure this *fistula*, till nature has restored the tone of the neck of the bladder so as to retain the urine for some time, and prevent its running out as fast as it comes in. The wound may also continue fistulous from a stricture in the *urethra*, produced by some former disorder in that canal, and therefore the surgeon ought to inform himself how the patient discharged his urine before the operation. If he could not make water in a full stream it must be owing to a contraction of the *urethra*, and no wonder the urine coming from the bladder should preserve to itself the more easy passage through the wound: in this case the surgeon must enlarge the *urethra* with *bougies*, as we shall observe in treating of the *fistula in perinæo*; which is the only way either to prevent or cure this *fistula*.

Of an incontinence of urine.

An incontinence of urine may remain after the operation has been performed on either sex, and is owing to a weakness in the neck of the bladder, which cannot sufficiently close itself to prevent the urine from running out. In men this accident may have been occasioned by the situation of the stone before it was extracted, or it may have been owing to the operator.

It must be imputed to the first of these causes, if the stone has been lodged a considerable time either entirely or partly in the neck of the bladder, as has sometimes happened. If it has continued there long, and encreased, it has gradually dilated the neck of the bladder, so as to destroy its power of contracting itself sufficiently to retain the urine; nor can the surgeon possibly remedy this:

It is altogether the work of nature, and not to be effected even by nature herself but gradually, according to the different degree of dilatation which the stone has made.

THE surgeon may have occasioned this disorder, by making a too great, or an irregular laceration in the neck of the bladder; or the same thing may happen from the largeness of the stone: and it was upon this consideration that I advised the dividing of the *urethra*, the neck of the bladder, and the prostate gland, previous to the extraction; being convinced that the laceration caused by the stone in passing out will follow the same direction as the incision. Add to this, that it will occasion very little loss of substance. Nature only, as I observed before, can remedy this disorder; and, when it does so, requires a considerable time to bring it about. Would it not be proper therefore to make the patient wear the *constrictor penis* or yoke? I think not: this instrument might indeed be useful for some time, but would certainly bring on another complaint; for the urine continually filling the *urethra* as well as the bladder, would by degrees dilate that, and might break open the cicatrix *in perinæo*; and the *fistula*, which would consequently ensue, joined to the incontinence of urine, will be an additional disorder, and likewise incurable.

WOMEN are more subject to this complaint than men, as in them the neck of the bladder is not invested with the prostate gland, which strengthens that part. It is impossible to avoid either dilating or dividing the orifice of the bladder in order to extract the stone; and when the stone is large, it must necessarily make a dilatation and laceration proportionable to its bulk, or it could not pass. This is indeed a great misfortune to the sex, but the

the only method to prevent it is to have recourse to the operation in time, before the stone is arrived to any considerable size.

Of Stones in the urethra.

WE sometimes meet with an extraneous body lodged in the *urethra*. That most usually found there, is a stone, not formed in that part, but stopt in its passage from the bladder, being forced and carried along by the urine, till it meets with an obstruction. Two things may conduce to this accident; first, the size of the stone, if it exceeds the diameter of the canal; secondly, its unevenness, it is of an angular or an irregular figure. A stone may lodge in three different parts of the *urethra*, *viz.* in the membranous part situated on this side of the *glandulæ prostatæ*, between the neck of the bladder and the bulb of the *urethra*; secondly, in the *fossa navicularis* near the *frænum*; or thirdly, in some part of the canal along the *penis*. In such persons as are subject to nephritic pains and frequently void gravel, some of it may happen to lodge between the neck of the bladder and the bulb of the *urethra*, and may increase there; but this is an accident more common to patients who have been cut, the canal being enlarged in this place by the operation. The softness of the canal, which there more particularly stretches and gives way to the bulk of the stone, frequently occasions it to increase in that part, without either obstructing the passage of the urine or giving the patient pain; in this case, the canal grows larger insensibly, and being constantly dilated, becomes thinner and thinner; and what is remarkable is, the urine always preserves itself a passage

paſſage by making a kind of gutter or groove in the ſtone.

THE *urethra*, being thus preternaturally diſtended by the ſtone, at laſt burſts, and by examining the *perinæum* we may feel the hardneſs of an extraneous body; nor is it impoſſible for the ſtone in time to penetrate through the outward ſkin, as it had done through the *urethra*: an inſtance of which may be ſeen in my *Obſervations*, p. 276. But though the ſtone may puſh out thus by piercing the ſkin, it would be improper to let it increaſe ſo as to open itſelf a paſſage there, ſince in that caſe an incurable *fiſtula* would be the unavoidable conſequence.

WHEN therefore we are certain that a ſtone is lodged in this part, we ſhould make an inciſion *in perinæo* upon the ſtone itſelf, and extract it.

THE ſtone may prove to be of a very irregular figure, and it has ſometimes been known to extend along the neck of the bladder quite into its cavity; in which caſe, that part of the ſtone which is in the bladder, is generally larger than that in the *urethra*.

THOSE who have extracted thoſe ſtones, are ſenſible that, either for this reaſon, or becauſe of their irregular figure, which keeps them in a manner buried within the fleſh, it is very difficult to make an inciſion upon the ſtone itſelf, ſufficient to extract it eaſily; I would propoſe therefore, firſt, to make an inciſion *in perinæo* of a proportionable length to the ſize of the ſtone, and then penetrate deep enough to lay the ſtone bare, ſo as to reach it with the finger. This done, we paſs a *director* along the ſtone, and introducing a biſtory in the groove of the *director*, enlarge the inciſion at the bottom of the wound; for the ſtone being exactly incloſed, and as it were buried with-

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in the cellular ſubſtance of the *perinæum*, we cannot otherwiſe lay hold of it with the *forceps*: and if by examining with a probe, we find that one end of the ſtone extends into the bladder, we ought to paſs in the *director* there, and with a biſtory make a ſufficient opening in the neck of the bladder; ſince otherwiſe the ſtone might break in drawing it out, and that part of it which is in the bladder would continue there.

THE ſtone being brought away, there only remains a ſimple wound, unleſs there be any callosities; in which caſe we muſt endeavour to diſſolve them by ſuppuration, and when that is effected, we muſt try by proper medicines to procure a re-union.

THERE are ſeveral caſes where the wound does not cloſe without difficulty; as firſt, when that part of the *urethra* which extends along the *penis*, is contracted; for then the urine that cannot paſs eaſily through the *penis*, iſſues through the wound in the *urethra*, and hinders it from healing. The only way to prevent the wound's becoming fiſtulous in this caſe is, by dilating the *urethra* with the *bougies*, for the wound will never heal till that is enlarged.

A SECOND caſe wherein there is room to fear the wound will always remain fiſtulous, notwithſtanding our utmoſt endeavours to the contrary, is when the ſtone has extended itſelf into the neck of the bladder, and by continuing there has very much dilated it; for as this part, when diſtended, cannot readily cloſe ſo exactly as before the ſtone had lodged there, the urine flows continually through the wound, and prevents its healing; we muſt not therefore expect a cure, ſuppoſing it to be at all practicable, till the neck of

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the bladder has had ſufficient time to contract in ſuch manner as to retain the urine. This contraction is entirely the work of nature, and ſhould we ſucceed in curing the wound before the neck of the bladder is ſufficiently cloſed, the patient would neceſſarily loſe the power of retaining his urine, which would be a diſorder almoſt as troubleſome as the *fiſtula*.

If the ſtone is lodged near the extremity of the *penis* in the *foſſa navicularis*, it may be generally turned out with a *ſcoop*; but if any points or inequalities of the ſtone ſtick in the internal coat of the *urethra*, we muſt firſt diſengage them by introducing a fine probe beyond the ſtone, and then paſſing it all round. If this cannot be done, the orifice of the *glans* muſt be enlarged by a ſmall inciſion, terminating at a diſtance from the *frænum*; after which the *ſcoop* being conveyed behind the ſtone, brings it eaſily away.

If the ſtone is lodged in the *urethra* along the *penis*, and cannot be moved by the courſe of the urine, we muſt compreſs the *penis* moderately juſt above the ſtone to prevent its returning back, and then inject ſome oil into the *urethra* to lubricate the paſſage; we afterwards introduce a ſmall *ſcoop* beyond the ſtone, and endeavour to extract it. If the inequalities of the ſtone prevent its coming forward, a fine probe may be introduced as was before directed, and the *ſcoop* paſſed in afterwards. If theſe methods fail, the operation muſt be immediately performed to get the ſtone out, as its lodgment there ſtops the paſſage of the urine.

In order to perform this, we begin with drawing the ſkin of the *penis* towards the *prepuce*, and taking hold of the *penis* where the ſtone is lodged, we place the left fore-finger and thumb, one

one above and the other below the ſtone, whilſt the middle finger, being placed upon the *corpus cavernoſum*, directly upon the ſtone, fixes it and makes it preſs outwards. We then make a longitudinal inciſion in the *urethra*, with a ſtraight biſtory, upon the ſtone; and if its inequalities hinder the edge of the knife from making the inciſion ſufficiently large, we muſt finiſh it by paſſing the point between the *urethra* and the ſtone, and cutting from within outwards. This done, the ſtone comes away of itſelf, or is eaſily extracted with a *ſcoop*. Immediately we retract the ſkin of the *penis*, which we had before drawn forwards, whereby the internal wound is covered, and prevents the urine from paſſing that way. In order to retain the ſkin at the root of the *penis*, ſo as to prevent its returning back towards the *glans*, which would render the inciſion of the *urethra* and that of the ſkin parallel to each other, it muſt be fixed with an adheſive plaſter on the *pubis*.

A LITTLE dry lint and a circular bandage is ſufficient for the dreſſing, and the wound will ſoon heal.

Of the FISTULA in PERINÆO.

THOUGH every *fiſtula*, ſtrictly ſpeaking, which is ſeated between the *anus* and the *ſcrotum*, may be included under this denomination, yet cuſtom has appropriated the name to that only which is ſituated in this part, and gives paſſage to ſome of the urine that iſſues from the bladder.

THIS *fiſtula* is an opening in the ſkin correſponding to another in the *urethra*, and therefore may be compared to a complete *fiſtula in ano*,

where there is an opening in the *rectum*, by which part of the excrements ſometimes eſcape and paſs out through the orifice in the ſkin.

The difference of fiſtulæ in Perinæo.

THE *fiſtula in perinæo* is of the ſame nature with all other *fiſtulæ*, in reſpect to its outward opening being ſmall, and ſurrounded with calloſities; but there is this difference in the *fiſtulæ perinæi*, that ſome have only one external opening, others have ſeveral, through which the urine paſſes, as out of a watering-pot. Theſe openings are not always in the *perinæum*, being ſometimes found in the buttock, in the *ſcrotum*, and even in the groin. I have ſeen them alſo round the *anus*, where they were taken for *fiſtulæ ani*, and treated as ſuch.

ONE would naturally conclude, from viewing theſe numerous openings in the ſkin, that the *urethra* was pierced in more places than one, and yet we find by experience that one ſingle opening in that is ſufficient to produce ſeveral externally; for upon examining the bodies of ſuch as have died and have had this complaint, no more than one opening has ever been found in the *urethra*, though there were ſeveral in the ſkin. This opening generally happens between the neck of the bladder and the bulb of the *urethra*, and it is reaſonable to ſuppoſe, that the *urethra* ſhould be penetrated ſooner in this part than any other, as it is here of a looſe and ſomewhat membranous ſubſtance, whereas from the bulb to the *glans* incluſively, it is of a ſtrong aponeurotic texture.

CAUSES. An abſceſs may be formed in *perinæo*, and the matter penetrate the *urethra* in the ſame manner as thoſe abſceſſes which are formed in the fat inveſting the *rectum*, the matter of which per-

perforates that inteſtine. In ſuch a caſe, part of the urine iſſuing through this orifice may render the ulcer fiſtulous.

THE inciſion made *in perinæo* to extract a ſtone from the bladder may not happen to cloſe exactly, and this may occaſion a *fiſtula*; but theſe caſes are uncommon, and the *fiſtulæ in perinæo* generally owe their origin to ſome diſorder in the *urethra*.

THE moſt uſual cauſe of diſorders in the *urethra* is a clap ill cured, and indeed ſometimes a cure judiciouſly treated may be attended with this unlucky accident. This, I ſay, is the moſt uſual cauſe, for I have known patients who, without ever having had any venereal complaint, have yet had their *urethra* ſo contracted that the urine would hardly paſs but by drops. In claps, there are ulcers in the *proſtatæ*, and oftentimes ſmall ulcers in the internal coat of the *urethra*, the whole length of the canal: now though the ulcer in the *proſtatæ* may be healed by the application of proper remedies, yet thoſe glands always remain larger than they were before the diſeaſe happened, and they compreſs the neck of the bladder in ſuch a manner that the urine paſſes with difficulty and in a ſmaller ſtream. By this means the courſe of the water being retarded in the membranous part of the *urethra*, by paſſing from a narrower canal into a larger, it often cauſes ſome drops to remain there. Again, the ſmall ulcers that ariſe in the internal part of the canal, as they cicatrize, leſſen its diameter, for every *cicatrix* contracts the part. Hence the urine is not diſcharged in a full ſtream, and not only ſome drops may remain in the *urethra* and lodge there, but the difficulty the urine meets with in paſſing

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tends to dilate the canal in its weakeſt part; for the urine acts againſt the ſides of the *urethra* in proportion to the reſiſtance it meets in thoſe parts that are contracted. This dilatation is another reaſon why ſome drops ſhould lodge behind, and this will certainly be in that part of the *urethra* which is ſituated between the *proſtatæ* and the bulb; not only becauſe the *urethra* is of a looſer and almoſt membranous texture in this place, but likewiſe becauſe, in the natural poſition of the body, whether ſtanding or lying, this part of the canal is ſituated lower than the reſt. It is in this part therefore that ſome drops of urine lodge and corrupt till they are carried away by freſh urine. Here it inflames the internal coat, and ſoon produces an excoriation, which degenerates into an ulcer, and may be the origin of ſeveral different diſorders. In ſome of theſe ulcers a *fungus* ariſes; in others the ulcer pierces the internal coat of the canal; and in others again, both the coats are opened, and the urine, inſinuating itſelf into the cellular ſubſtance of the *perinæum*, produces abſceſſes there which give riſe to *fiſtulæ*.

It is proper to obſerve, that in all theſe caſes, where the urine paſſes through the *urethra* with difficulty, the bladder hardly ever diſcharges its contents entirely, and the urine which lodges in that receptacle gradually renders it diſeaſed.

Prognostic. When experience has once taught us the difference of theſe diſorders, it will not be difficult to form a juſt prognoſtic of them, and this prognoſtic will be according to the circumſtances that attend. As they proceed from a lodgment of the urine in the membranous part of the *urethra*, which lodgment is occaſioned by a contraction of ſome part of the canal, we may in

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general pronounce them curable, provided a free and easy course be procured for the urine by enlarging the canal; it being nature's design that the urine should be freely discharged this way: and we may further add, that if we fail in answering this intention, all other assistance of surgery will prove ineffectual.

We will now return to the ulcer in the membranous part of the *urethra*; and though the disorders which spring from thence may be, and indeed generally are, discovered with it, yet I think it will be best to treat of them separately.

Of fungous flesh in the urethra.

The fungous loose flesh produced by the ulcer may be justly termed a carnosity, and as it is often moistened by the urine, it soon ceases to be flabby, and becomes callous, forming a kind of mass between the neck of the bladder and the bulb of the *urethra*, thereby obstructing the course of the urine in a greater or less degree. In some, the urine passes only in a very small stream; in others, but by drops, or can hardly be discharged at all. The disease may continue in this state some little time, but the urine will at length penetrate the *urethra*, and what was before only a carnosity will degenerate into a *fistula in perinæo*. The only means to prevent this is, by softening the callosities, bringing the ulcer to suppurate, enlarging the canal, and in a word, by removing the original cause of the disease.

All these intentions may frequently be answered by the use of *bougies*, armed with medicines agreeable to the state of the disorder, and carefully introduced through the *urethra* into the bladder.

bladder. The medicines made use of on these occasions should by no means be irritating; and for this reason I should absolutely reject the use of any caustic introduced into the *urethra* on pretence of destroying the carnosities, since, as I have learned from experience, they serve only to eat into the canal.

THESE *bougies* are made either of cat-gut; of linen dipt in wax and rolled; or of linen waxed and rolled upon the cat-gut. The second kind of these are improper to be used, as they soften in the canal by the heat of the part, and cannot readily be passed into the bladder. The size of the first *bougie* that is to be introduced may be determined by observing the size of the stream of urine; and in order to introduce it, we take hold of the *penis* at the *corpora cavernosa* below the *corona glandis*, being careful not to compress the *urethra*; with the same hand we extend the *penis* a little, in order to streighten the *urethra*, if it is curved, as sometimes happens, and to smooth any wrinkles that may be formed by the internal coat, which might otherwise stop the end of the *bougie*. By this means likewise if there are any strictures in the passage, we are sure by extending the *penis* to contract those parts of the canal where there are none, and to render them for the time almost of the same diameter as the parts in which these strictures are situated. We learn from anatomy, that the whole extent of the *urethra* is furnished with *lacunæ* which open into its cavity; and as the *lacunæ* open into it from behind forwards, these strictures sometimes, if they are not produced by *cicatrices*, are nothing else but the mouths of the *lacunæ* affected with a spasmodic contraction from the dis-

order of the *urethra*. Taking hold therefore of the *penis* with one hand, as was before directed, below the *corona*, we with the other introduce the *bougie* as far as we can into the *urethra*, and if possible, into the cavity of the bladder. In proportion as the *bougie* advances into the canal, we frequently feel strictures, which it gets beyond, meeting also with others which prevent its advancing, and quite stop it. In this case we must draw back the *bougie* so as to disengage it, and then turn it a little, after which we must again push forwards, feeling and searching as we go. If we cannot possibly get the *bougie* farther, we must leave it where it is, contenting ourselves for that time with having made some progress. We must then cut off the *bougie* within a finger's breadth of the *glans*, and fasten it to a thread to prevent its coming out, twisting the thread round e crown of the *glans*.

The *bougie*, which, by the moisture of the part, swells in the *urethra* during its continuance there, in some measure removes the strictures it passed by at its entrance; and on pulling it out in an hour or thereabouts (for it must not be left in longer) you will find it twice as large as when it was put in. Next day another must be introduced of the same size, which easily gets beyond the first strictures that had given way to the former *bougie*, and sometimes we are so fortunate as to get past fresh obstacles: thus gradually gaining ground, we at last get it into the bladder. When we have passed in the *bougie*, we must fasten a thread to that end of it which remains out at the orifice of the *glans*, in order to withdraw it easily in case it should slip into the *urethra*; or, as has been known to happen, for fear the *bougie* should pass entirely

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into the bladder. In 1735, I cut a man, from whom, inſtead of a ſtone, I extracted a *bougie* of rolled and waxed linen without cat-gut. It was a foot long, and had been left in the bladder, where it was collected in a lump. After the *bougie* has been paſſed two or three times, we muſt make uſe of a larger one; that is, one of the ſame diameter as the other when ſwelled. This ſecond *bougie* ſwells in the ſame manner, and enlarging the canal ſtill more, the urine begins to diſcharge with greater freedom. When the *bougies* of cat-gut enter readily, we muſt uſe thoſe that are made of linen rolled neatly upon the cat-gut: theſe will not adapt themſelves to the preternatural windings of the *urethra* as the former did, when they became ſoft, but on the contrary will new-mould and ſtreighten the canal; and thus by little and little we enlarge the ſize, till we have dilated the *urethra* ſufficiently.

It is proper to obſerve, that, in order to facilitate the introduction of the *bougies*, we muſt bend the ſmall end a little that goes in firſt, that it may adapt itſelf the more readily to the curvature of the *urethra*; and they muſt be rubbed either with oil or ſome emollient, reſolvent, or drying ointments, according as the caſe requires.

The uſe of *bougies* often occaſions a ſuppuration in the *urethra* almoſt like that of a *gonorrhœa*: this ſuppuration is frequently very beneficial in diſſolving the calloſities, and continues no longer than whilſt the *bougies* are uſed.

When by ſuch means the canal is reſtored to its natural diameter, the ulcer is ſoon healed by the uſe of drying *bougies*, and a *fiſtula* no longer to be apprehended; but we find by experience that whenever the *urethra* has been thus dilated,

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it is apt in time to contract again, and to be subject to the same symptoms. I have known this happen three years after the cure was first effected.

The patient may easily become sensible of this by observing the stream of his urine; but, in order to prevent a relapse, he ought every seven or eight days to use a *bougie* or leaden probe of a proper size, and to leave it an hour or two in the passage.

If the urine penetrates the internal coat of the *urethra*, some drops of it will necessarily insinuate themselves between that and the external coat. Now between these, as we learn by anatomy, there is a cellular substance almost like that of the *corpora cavernosa*; like that also it is tendinous, and swells in erection. A small quantity of urine getting into this, and insinuating itself from cell to cell, hardens the substance and renders it callous and contorted, so that it feels like a very hard cord running along the *penis* and the *perinæum*. The urine in this case passes with difficulty, and in a greater or less stream according to the degree of disorder, as may be seen by directing the patient to make water; when the urine being restrained in its passage forces against the sides of the canal, whereby it dilates them in the membranous part, and more easily lodges there. This causing the disorder to encrease daily, the canal is entirely penetrated, and in time are formed *fistulæ in perinæo* that prove very difficult to be cured. The only means either of stopping the progress of this disease or curing it, is to dilate the canal by *bougies*; by means of which we are likewise enabled to apply proper remedies to the ulcer.

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In this case the *bougies* are with difficulty introduced, as the strictures formed by the contraction of the canal in different parts of it are not easily passed over. At first we can only introduce a very small *bougie* of cat-gut, the flexibility of which allows it to adapt itself to the winding of the *urethra*, and will not be liable to force itself any new passage by penetrating the *urethra*. Thus we must patiently endeavour to surmount a single obstacle first, and then another, without attemping to reach into the bladder at once.

When the easy introduction of the *bougies* will allow of using those made of the waxed linen rolled upon cat-gut, they by their solidity may streighten the crooked canal, and may also be armed with proper medicines, either to promote a suppuration or to cleanse and dry up the ulcer occasioned by the lodgment of the urine in the membranous part: after which the water begins to have a free passage through the canal, and no longer obstructs the cure.

If the urine gets through both the membranes of the *urethra*, and diffuses itself into the cellular substance, the urine will pass from cell to cell, and continuing there some time as an extraneous body, will unavoidably produce an inflammation, and in consequence thereof an abscess. The matter of these abscesses pierces through the skin in one or more places, and the urine flowing thither continually, preserves itself a passage by preventing these openings from healing. Some of this urine passing through these orifices with difficulty will lodge in the neighbouring parts, and hardening the flesh there, will produce callosities, which afterwards increase very considerably. In proportion to the number of these callosities, and to the

difficulty the urine meets with in paſſing, the water works itſelf new paſſages, and forms new abſceſſes; and hence it comes to paſs that we ſometimes find urinary *fiſtulæ* extend even into the groins. It is not a very uncommon thing to find ſtony concretions here, from the lodgment of the urine in the fleſh before it makes its way out through the fiſtulous openings.

We are taught by the rules of ſurgery, that in order to cure a *fiſtula*, the outward opening muſt be enlarged, and the calloſities extirpated or deſtroyed; but as the *fiſtula in perinæo* differs in many particulars from other *fiſtulæ*, we muſt not always adhere to this rule: and, to ſet this matter in a clear light, I will ſuppoſe different caſes to occur.

And firſt, I will ſuppoſe a patient who has one or more fiſtulous orifices through which both matter and urine come away; that this diſorder being of ſome ſtanding, we may feel ſeveral calloſities deep in the *perinæum*; and that, upon directing the patient to make water, we find the urine paſſes with difficulty and in a very ſmall ſtream.

In ſuch a caſe, the firſt intention to be anſwered is to enlarge the *urethra* that the urine may have a free courſe. This we are to attempt with the *bougies*, for the canal is ſo contracted as not to admit a *catheter*. In proportion as the canal is enlarged, leſs urine paſſes through the *fiſtula*, and we frequently find the calloſities ſenſibly ſoftened, and ſometimes the fiſtulous openings heal up of themſelves: a pretty ſure ſign of an approaching cure. Thus I have often known *fiſtulæ in perinæo*, which were very conſiderable from the multiplicity of their openings, cloſe of themſelves and do perfectly well only by the uſe of *bougies*; nor

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need we be ſurprized at this; for when the natural paſſage is opened, the urine of courſe paſſes through it, and no longer forces againſt the ſides; after which the preternatural opening in the *urethra* gradually cloſes, and nature endeavours to diſſolve the remaining calloſities by ſuppuration; as alſo to fill up the cavities and to form the *cicatrices*, as ſhe oftentimes does in very large abſceſſes, that have opened of themſelves, and have healed with a ſimple plaſter only; which plaſter could not poſſibly be of ſervice in filling up the cavity cauſed by the abſceſs.

ALL theſe efforts of nature however cannot heal thoſe *fiſtulæ* where there are ſtony concretions, or where the calloſities are too much confirmed. Theſe caſes require the aſſiſtance of art; and in order to effect a cure we muſt follow the general rule of enlarging the outward opening to procure a paſſage for the extraneous bodies, and diſſolve the calloſities.

IT may be proper to repeat here, that, in order to prevent a return of the diſorder, the patient ought once a week, for ſome years, to uſe either a *bougie* or a leaden probe, which, though an inconvenience, is preferable to a return of the diſorder.

LET us ſuppoſe now that the *urethra* is become ſo callous and contorted that it is abſolutely impoſſible to introduce a *bougie*. In this caſe very little urine paſſes through the *penis*, and the calloſities and *fiſtulæ* are numerous. I have ſometimes ſeen the *ſcrotum* ſo loaded with calloſities, that together with the *perinæum*, it appeared but one lump of them intermixed with fiſtulous holes. The more calloſities there are, the more the paſſage of the urine is obſtructed, and the patient

patient probably will ſoon die under ſuch circumſtances.

THE means of removing this diſorder is by one or more operations. As the *bougies* cannot enter the *urethra*, the ſtaff cannot be made uſe of to conduct the knife into the bladder: in ſuch caſes the operator may derive great advantage, from the knowledge of anatomy, by which he is acquainted with the ſtructure of the *urethra* from the *ſcrotum* to the bladder, and thereby avoids cutting into it improperly. The method of proceeding on this occaſion cannot be better ſhewn than by giving an account of a ſimilar caſe, with the means which were uſed in the cure.

IN 1730, I attended a patient who had ſuch a number of calloſities in the *perinæum* and *ſcrotum*, that I could not diſtinguiſh the teſticles; the *ſcrotum* and *perinæum* forming, as it were, one ſhapeleſs lump. Theſe calloſities had about thirty fiſtulous holes in them, through which the water paſſed only in drops. Very little urine came away through the *penis*, and as I could not introduce even the ſmalleſt-ſized *bougie*, I judged that the only method of curing this patient muſt be by an operation. Having therefore prepared him by twice bleeding, I placed him in the ſame poſture as in cutting for the ſtone, and made a very long and deep inciſion into the calloſities on the *perinæum* near the part where I imagined the *urethra* to be, for I could not juſtly diſtinguiſh it; and with a ſecond cut, I took away part of the calloſities on the ſide of that branch of the *iſchium* which riſes towards the *os pubis*, immediately filling up the wound with lint. The next day I placed the patient in the ſame poſture to take off the dreſſings, and having

Having removed the lint, and directed him to make water, I have observed the urine to pass through at several places: I introduced a piece of *bougie* into the orifice that seemed nearest the *urethra*, and left it there; but it was impossible to put in above an inch of it, on account of the winding of the fistulous *sinus*. I then dressed the wound with a simple digestive, taking care to keep the lips open. The same dressings were repeated the two succeeding days, and at each time I passed the *bougie* a little farther into the *sinus*. In short, the fifth day it entered into the *urethra*, of which I was fully convinced when, on pushing it forward, it passed into the bladder. Having gained our point thus far, I conveyed a *director*, the end of which was open, along the *bougie*, and having drawn away the *bougie*, the groove of the *director* served to pass in a *bistory*, with which I opened the whole passage to the neck of the bladder inclusively; making the same incision as for the stone, and taking care to avoid cutting the *rectum*. This done, by means of the same *director*, I passed in a leaden *canula*, one end of which entered the bladder, and the other was fixed by the bandage even with the skin of the *perinæum*. The rest of the wound was dressed in the common way.

The urine coming freely through the *canula*, passed no longer through the preternatural openings which it had before formed for its passage, and the callosities were partly dissolved. The *urethra* began to admit the introduction of a *bougie*, so that I could pass in a small one very well as far as the wound. Having, by the use of different sized *bougies*, dilated the *urethra* to a certain degree, I judged it necessary to produce a suppuration by a more effectual method than what we could

could procure by them, and therefore introduced a small *catheter*, the eyes of which coming out at the wound I passed a thread through them, and by withdrawing the *catheter* I brought out the thread through the *penis*. This thread served to pass in a *seton*, which I armed with a mixture of *ungt. dialthææ* and *empl. c̄ Gum.* melted together, and changed it at every dressing. We continued this method three weeks, during which time the wound suppurated very considerably, and all the callosities were dissolved, so that the wound became like that of a patient who has been cut for the stone about three weeks.

I THEN removed the *canula*, and passing the *catheter* through the *penis* into the bladder, let it remain there between five and six days, in which time the wound, that was entirely left to nature, in a great measure closed. I then took away the *catheter*, and suffered the wound to heal entirely, which it did in about a fortnight with the most simple dressings.

I ADVISED the patient afterwards to the use of *bougies* or a leaden probe, without which the *urethra* might gradually contract again, the *cicatrix* open, and the disease return.

I WILL now suppose that the urine, instead of causing those small abscesses which produce *fistulæ*, has inflamed the whole cellular substance of the *perinæum*, and formed one of those large urinary abscesses, which, extending sometimes to the *scrotum*, brings on a suppuration throughout the whole cellular substance of these parts. Whilst the *pus* is forming, the *urethra* is affected by the inflammation, and occasions a retention of the *urine*, for which we are frequently obliged to introduce the *catheter*. All the other symptoms that are com-

mon to the formation of large abſceſſes in general, attend alſo in this caſe.

As ſoon as ever we perceive a fluctuation in theſe abſceſſes they muſt be opened in their whole extent, or the matter entirely ſeparates the neck of the bladder from the cellular ſubſtance that inveſts it, and *ſinuſe* form there, which ſometimes extend very far. The wound is to be dreſſed at firſt with dry lint, like other abſceſſes.

It will be abſolutely neceſſary to uſe the *catheter* to draw off the patient's water till the firſt dreſſings are removed; but after that, he generally diſcharges it without his aſſiſtance, and you may depend upon ſeeing ſome of it paſs through the wound. Upon obſerving the ſtream of urine which paſſes through the *penis*, we ſhall certainly find it ſmaller than it ought to be, and this it was that occaſioned the diſorder: the uſe of *bougies* therefore muſt be ſpeedily recurred to, or the wound will remain fiſtulous. The reaſon of this is plain: the urine had formed itſelf a new paſſage, by the natural one being contracted, and not performing its office; and if the *urethra* is not as open as it ſhould be, the water will either preſerve itſelf a free courſe through the preternatural opening already made, or will form new ones. As to the dreſſings, they are to be ſuited to the time the diſeaſe has continued, and the ſtate it is in.

A sufficient time muſt be allowed to dilate the *urethra* by the *bougies*, which ſhould be very gradually enlarged. If the uſe of theſe was deferred till the wound was filled up and required only cicatrizing, we ſhould thereby loſe a great deal of time, and the edges of the wound, inſtead of cicatrizing, would probably become callous. For theſe reaſons I would recommend the uſe of

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the *bougies* as soon as ever the digestion is pretty well established, at which time the relaxation of the parts that were obstructed renders the introduction of the *bougies* more easy.

I ADVISED, in the observation preceding this, that a *catheter* should be passed into the bladder when the wound is almost filled up, because as in that case the callosities were very numerous, and I cut away part of them, it might have happened that the internal *cicatrix* would have rendered the canal crooked; but in this, where there are no callosities, that accident is less to be feared, and I think we need not use the *catheter*.

I HAVE not taken notice, in any of the cases before recited, either of bleeding, a regimen, fomentations, cataplasms, or other remedies which might occasionally be found necessary in the course of the distemper, as I thought it improper to break into the order of the disease, and of the assistance that might be administered by operation only. There are general or particular remedies made use of by surgeons in almost all cases, and of which we have already treated in the preliminary chapter of operations. The circumstances, which differ in almost every case, can alone direct which of those remedies is to be preferred.

I WILL only add further, that as all *fistulæ in perinæo* may in several particulars be different, so none but general rules can be laid down for the treatment of them. The case just related, and some others that may be found in my *Observations*, may be useful in furnishing the young practitioners with such hints towards effecting a cure, as by reflexion may be brought into practice, and be adapted to the different circumstances of their patients.

Of

Of the CANCER.

THE writers who have treated this ſubject, have repreſented a *cancer* as a ſordid, ſpreading ulcer, and have looked upon it as incurable; but this definition is not adapted to the *cancer*, either when incipient or during its progreſs.

IN order that we may omit nothing relating to this diſeaſe, I ſhall begin with it from its firſt appearance, and ſhall endeavour to trace it through its ſeveral variations.

EVERY *cancer* begins by the obſtruction of one or more glands, and is at firſt only a tumor formed by obſtruction; but afterwards it becomes ſchirrous, and then carcinomatous.

WE find by experience that the conglomerate glands are moſt ſubject to this diſtemper; but as every gland may become ſchirrous, ſo every gland may likewiſe become carcinomatous; and as every part of the body is furniſhed with glands, ſo every part may conſequently be ſubject to a cancer; thus we diſcover them ſituated in various places, ſometimes even in the ſkin.

WITHOUT regarding the ſeveral diſtinctions which authors have made of this diſeaſe, I ſhall ſpeak of it as of a *ſchirrus* ſuſceptible of alterations; for as the glands differ both in their ſtructure and the nature of the fluids which paſs through them, ſo from hence muſt neceſſarily ariſe a difference in the ſchirrous tumours and cancers which are formed in different glands.

CAUSES. The compact ſtructure of the glands and the contortion of their veſſels, prevent any obſtruction once formed in them, from being eaſily

eafily difperfed; and the fluids being confined there, may by their lodgment change their nature and become acrimonious. So long as the fluids remain unaltered, the tumor is no more than a fpecies of *fchirrus* that encreafes more or lefs, but as foon as the fluids are vitiated the tumor becomes carcinomatous. I do not fay that they all become fo from the time of the obftruction; I only fay, that this may happen, which depends entirely upon that kind of alteration with which the fluids fo obftructed are affected. If it was poffible to determine the alterations that happen in thefe fluids, we might eafily explain, why fome of thefe tumors become carcinomatous in a little time, even whilft they continue very fmall; why others do not undergo this change till after a confiderable time; and, in fhort, why others increafe very much before they alter their difpofition, and at laft become very painful, yet without any apparent inflammation, and even without any change of colour in the fkin. But our knowledge of the fluids is too limited to enable us to determine what produces this change, and if we fpeak ingenuoufly, we cannot avoid confeffing that we are but imperfectly acquainted with them in their natural ftate; how then can we prefume to fpeak affirmatively of their morbid ftate, and explain all the degrees of alteration which they undergo? Of the two, it would be eafier to account for what happens to wine, which, after being fqueezed from the grape, may turn four, oily, bitter, or become an excellent liquor. In this obfcurity then, let us confine ourfelves to what our fenfes teach; and, without lofing time in vain reafonings, which would be fubject to contradiction, let us be fatisfied with knowing that the

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obſtructed fluids, which form ſchirrous tumors may corrupt; that they ſometimes are vitiated to that degree as to become cauſtic, and corrode the veſſels where they lodge; that conſequently what was at firſt but a ſchirrous ſwelling, changes to a *carcinoma*, and afterwards an ulcerated *cancer*. My deceaſed father having cut off a carcinomatous tumor from a lady's breaſt, in the middle of which was a *cyſtis* filled with a fluid; I opened it, and part of its contents ſpurting out upon my cloaths, deſtroyed the colour of them as if it had been *aqua fortis*. Some of it flew into my face, and I felt continual ſhootings there for ſeveral hours, though I immediately waſhed the part.

THIS we may venture to aſſert, that the cauſes of a *cancer* may be either external or internal. Every blow or compreſſion on the glands may cauſe an obſtruction, and this obſtruction may give riſe to a *cancer*. The tumor, which, as yet, is only ſchirrous, and which perhaps will always continue ſo if not tampered with, may degenerate into a *cancer* by the injudicious application of a cauſtic, which only ſerves to irritate inſtead of deſtroying it entirely. This has frequently happened when cauſtics have been applied to the ſmall ſchirrous tumors which come in the face and are lodged only in the ſkin. The ſame effect may be produced by the uſe of ſuch cataplaſms or plaſters as are capable of heating the part, and thereby exciting motion in the obſtructed fluids; and this we often ſee happen to women who have received a blow upon the breaſt. To theſe cauſes, which are merely external, we may add others ariſing from a diſorder in the animal œconomy. The moſt uſual cauſe of

cancers is internal, and may be accounted for, as was before obſerved, from the ſtructure of the glands and the diſpoſition of the fluids to become vitiated. Thus women having a large number of glands in the breaſt and *uterus*, which ſecrete fluids that are very ſubject to become acrid, are conſequently more liable to *cancers* than men. The influence that their *menſes* have upon theſe glands, which ſwell during their courſes, contributes to their being very eaſily obſtructed when any thing either ſuppreſſes thoſe evacuations before their time, or when they entirely ceaſe according to the courſe of nature.

We likewiſe find that the vitiated humours which occaſion head-achs, rheumatiſms, or habitual and periodical evacuations, ſometimes change their courſe from cauſes unknown, and paſſing to the glands, produce an obſtruction in them. All theſe obſtructions form at firſt no more than ſchirrous ſwellings; but they may afterwards degenerate, as I obſerved before, into *carcinomas*.

Signs. The ſigns that indicate a *ſchirrus*, or a *ſchirrus* become carcinomatous, as alſo thoſe which ſerve to diſtinguiſh an ulcerated *cancer* from any other ulcer, are very different.

The *ſchirrus* forms a tumor more or leſs large and indolent: in its beginning it is round and often moveable, ſo that by laying a finger upon it, we may change its ſituation. In its progreſs it generally becomes leſs round and leſs moveable by adhering to the adjacent parts. As long as this ſwelling continues only ſchirrous, there is no alteration of colour in the ſkin that covers it, even though it encreaſes very conſiderably; but when the *ſchirrus* becomes

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carcinomatous, it grows more or leſs painful ac-cording to the kind and degree of alteration in the fluids that ferment there. This pain is ſome-times dull, ſometimes attended with a pulſation or throbbing, and ſometimes with ſhootings or pricklings like the wounds of a dart or needle. In ſome theſe pains are felt only at particular times, in others they are almoſt continual. The ſwell-ing generally loſes its round figure, and appears more or leſs irregular, according as the neigh-bouring parts become obſtructed, or, by adhering to it, encreaſe its bulk. The veins about the tumor are varicous, and eaſily diſcerned through the ſkin; and upon this account the ancients have given the name of *cancer* to theſe kind of tumors, as the veins ſeem to reſemble the claws of a crab. The obſtruction of theſe external veſſels proceeds from that of the veſſels within the tumor.

AGAIN, though the tumor ulcerates, it does not ſubſide, but the pains increaſe and become continual. In the part where the pain is moſt acute, there appears at firſt a redneſs, and eſchars or ſloughs are afterwards inſenſibly formed there, proceeding from the gangrene or deſtruction of part of the tumor; the natural effect of the total obſtruction joined to the diſpoſition that the fluids are then in. Theſe ſloughs extend farther and farther as well upon the ſurface as in the middle of the ſwelling; and as all the veſſels of the part are varicous, hæmorrhages break out from time to time, according as any of the veſſels are de-ſtroyed by the ſpreading of the gangrene. This ſordid ulcer continually increaſes, in oppoſition to every means that can be tried to prevent its pro-greſs; nor will it admit of being deterged, and

an ulcer with a putrid bottom can never generate good fleſh.

FROM the preceding ſigns it is no difficult matter to diſtinguiſh a *cancer*, even that which affects the ſkin of the face, and is termed by the antients a *Noli me tangere*; but to what has been already ſaid of the *cancer* in general, I ſhall ſubjoin ſeveral circumſtances that relate to particular *cancers*, which depend upon the parts affected, and can be learnt only from experience.

CANCERS which come on the face generally attack one of the lips, though ſometimes they affect the noſe and eye-lids. This kind of *cancer*, when it ulcerates, is always attended with an hardneſs, which hardneſs extends in proportion as that which formed the firſt tumor is deſtroyed by eroſion, and is always preceded by a change in the colour of the ſkin, which, before it indurates, turns red. This appearance of redneſs deſerves particular notice, as will be hereafter ſhewn in the cure. See my *Obſervations*, page 42.

BOTH ſexes may be affected with *cancers* in the breaſt, but it happens much more commonly to women, as their breaſts are of a more glandular texture, being deſigned for the ſecretion of the milk that is to nouriſh the child.

OF all the *cancers* that are formed in that part, it is very ſeldom we find two that are perfectly alike; but the differences between them are of great importance to be known, in regard to the method of treating them. Some begin by a ſingle point, which is certainly no more than one gland obſtructed. It is very difficult to diſtinguiſh this under the finger, and, if quite free from pain, it is merely by chance that the patient diſcovers it: but when it becomes large, its bulk renders

it eaſily diſtinguiſhable. If it is ſituated ſuperficially, it is moveable; if deeply lodged, it is not ſo eaſily moved. This gland, though as yet but merely a *ſchirrus*, may be painful from the very beginning, without having acquired any carcinomatous diſpoſition; and this may happen from ſeveral cauſes. The pain may be occaſioned by a ſlight inflammation affecting the gland only; or it may ariſe from too great an extenſion of the fibres that compoſe the obſtructed gland; or laſtly, the preſſure of the tumor upon ſome nervous part may produce this ſymptom. But if the pain ariſes from the corruption of the obſtructed fluids, which are degenerated and become acrid, the gland is then carcinomatous, as will ſoon afterwards appear by an increaſe of the diſorder.

We ſometimes find very conſiderable obſtructions in womens breaſts, which obſtructions have been formed by degrees, and (as they were free from pain) without their being ſenſible of them, the preternatural ſize of the breaſt giving the firſt occaſion to take notice of them. This is moſt frequently ſeen in very fat women after their *menſes* have left them, and is generally the beginning of a *cancer*, which increaſes pretty faſt, as ſoon as it grows painful. Though this obſtruction renders the breaſt much larger than is natural, yet the nipple appears ſunk inwards.

It ſometimes happens that the *cancer* attacks the breaſt only; ſometimes the whole adipoſe ſubſtance lying behind the tendon of the *pectoralis major* becomes affected, growing unuſually compact and hard in its texture, and after being extirpated by an operation, has been found full of ſchirrous glands. At other times the whole arm-

pit is filled with schirrous glands, which in time turn cancerous.

SOMETIMES the cancerous tumor is entirely separate from the fleshy part of the pectoral muscle, at other times adheres to it, and extends itself between the interstices of the fleshy fibres: I have seen some which reached to the cellular substance that connects that muscle to the intercostals, and in these cases a considerable part of the muscle was included in the tumor. If the swelling is free from any attachment to the pectoral muscle, it is moveable in whatever situation the arm is put; if it adheres, it seems also to be moveable and separated from the muscle when the arm is brought forwards, because the fibres of the muscle follow the motion that is given to the tumor; but if the arm is kept fixed behind, the adhesion of the tumor to the fleshy fibres is then manifest by its being immoveable. It is an essential rule therefore to place the patient's arm in a proper position when we examine the tumor.

SOME *cancers* encrease very fast, others so slowly, that for many years the patients suffer hardly any inconvenience from them. This depends upon the disposition of the obstructed fluids.

IT is not an uncommon thing, when the breast is disordered, to have a discharge for several months, of a *sanies* or purulent *serum* from the nipple, or through the skin surrounding the nipple; which discharge however does not abate the disease of the breast, though, when it entirely ceases, the other augments much faster.

WE sometimes see instances of *cancers* where the humour consumes and destroys almost the whole breast in a few months; others where its pro-

progreſs is ſo ſlow that patients frequently bear them to a very old age without any conſiderable inconvenience. The firſt are very painful, the latter ſcarce at all.

CANCERS of the womb begin, like others, by an obſtruction, and may ſeize either on the neck or body of it: they may alſo affect either its internal or external parts, that is, they may ariſe either in its cavity, or in the cellular ſubſtance that inveſts it, producing ſchirrous indurations in the *pelvis*. Women who have been accuſtomed to a large diſcharge by their *menſes*, are more liable to *cancers* in this part than in any other, and the diſeaſe commonly begins when that diſcharge either is going off, or entirely diſappears. It is generally preceded either by a *fluor albus* or a flooding; and is diſcovered by wandering pains in the *pelvis* and in the *uterus*. Sometimes the ſchirrous tumors that are formed in the neck, or in the cavity of the womb, ulcerate, which is diſcoverable by a ſucceſſive diſcharge of a ſanious, ſharp, or bloody matter, and ſometimes by the coming away of fungous fleſh or ſloughs, which ſeparate and paſs out through the *vagina*. If the ſchirrous indurations do not ulcerate, the diſcharge in that caſe is not bloody, but frequently ſerous and acrimonious. In the mean time the pain continues, and upon introducing a finger into the *vagina*, you may diſtinguiſh the neck of the womb to be preternaturally large and hard.

THE indurations continue to increaſe, and when they become conſiderable, the *labia* ſwell and are frequently œdematous; and if the inguinal glands are obſtructed, as ſometimes happens, the *œdema* ſoon extends to the thighs and legs. The

carcinomatous indurations, which are ſituated in the *pelvis*, ſeldom ulcerate; but they may impoſthumate, or have encyſted dropſies formed upon them. See the chapter *Of the Dropſy*.

To conclude, *cancers* may ariſe in various parts of the body, and may be diſcovered by the preceding account of their different appearances.

PROGNOSTIC. A *ſchirrus* produced by a blow or compreſſion may, if it is free from pain, be cured by extirpation, and even if it become carcinomatous, may be cured by the ſame means; though there is this difference between them, that in the latter caſe the diſeaſe may return; which can be imputed to no other cauſe, than that ſome of the humour which was in the diſeaſed gland, having paſſed thence into the courſe of the circulation, has impregnated the lymph with the ſame taint.

A SCHIRRUS produced by the ſuppreſſion of ſome habitual evacuation, is incurable, unleſs that evacuation can be ſupplied by ſome other, or be brought to return again. Such, for inſtance, are thoſe *cancers* which ſometimes ariſe in women, when either their courſes are irregular, or are intirely ſtopt according to the courſe of nature. How many do we ſee, who at this turn of nature begin to have obſtructions in their breaſts, which become ſchirrous, and give riſe to *cancers?* In ſome women, the glands of the *uterus* are obſtructed; in others, the *ovaria*; and, in general, all theſe caſes end fatally; for which reaſon we can give but a very bad prognoſtic of theſe obſtructions, even though they are ſlowly formed, and for many years free from pain.

As to thoſe ſchirrous tumors, that are formed either by a ſlow or haſty depoſition of a morbid humour,

humour, which before affected the constitution under the various symptoms of head-achs, defluxions, rheumatic pains, sweats, &c. they may be removed by extirpation; but unless we are fortunate enough to correct the indisposition of the juices that produced them, the disease will almost certainly return, especially if it be of the carcinomátous kind.

Whatever parts are affected, either with schirrous or carcinomatous tumours, if they can be entirely extirpated, we may in general say, they are curable; but if they are so situated as not to admit the use of the knife, they are incurable by any other means. Such, for instance, are those tumors in the breast, where, at the same time, the glands of the *axilla* are swelled; or if the tumor strongly adheres to the pectoral muscle; sometimes also those which come upon the eyelids, or within the mouth; or, lastly, such as either affect the *uterus*, or arise in one of the great cavities. Our prognostic must likewise be regulated according to the different alterations that happen in these tumors. Whilst they continue free from pain, we cannot call them *cancers*, and if they do not grow bigger, they are inconveniences that may be easily sustained without injuring the constitution. But the case is very different, if they daily increase in size.

If, after a certain time, these swellings become painful, the *cancer* then commences, and in a short time probably the glands of the arm-pit are obstructed; in which case, I have known fresh *cancers* to arise in different parts, even after the extirpation of that which appeared at first. In this case also, the bones may break by being affected with the same cancerous humour.

CANCERS that are very painful, and increaſe very faſt, may be alſo looked upon as incurable.

LASTLY, we may reckon as ſuch every *cancer* that is ulcerated. I do not deny that ſuch a caſe may be cured by an operation; but this I can poſitively affirm from many inſtances, that ſuppoſing the patient recovers, the diſeaſe will return again, ſooner or later, either in the ſame part or ſome other. There may perhaps be ſome exceptions to what is here advanced, but they are ſo uncommon as not to invalidate what has been confirmed by numberleſs experiments.

CURE. In order to lay down any certain rules for treating a *cancer*, we muſt conſider it in its riſe, progreſs, and height.

I HAVE before obſerved that a *ſchirrus* is at firſt only an obſtructed gland, which in time may become ſchirrous, then carcinomatous, and afterwards an ulcerated *cancer*. It is in its firſt ſtate only, that it admits of a cure by the aſſiſtance of diet and medicines.

THE ſurgeon's earlieſt care ſhould be to make an enquiry into the origin of this obſtruction. If it proceeds from an external cauſe, and is recent, as from a blow, and if the pain immediately felt from thence either continues or increaſes, there is certainly ſome diſorder in the part injured that may produce an inflammation; in which caſe we muſt endeavour to abate this ſymptom by a proper regimen and plentiful bleeding, with the application of emollient cataplaſms to the part affected.

BUT tho' the pain and inflammation be removed, it is poſſible one or more of the glands may remain obſtructed, and be ſo much ſwelled as to be diſtinguiſhable by the touch. This we often find hap-

happen to women who have received a blow upon their breaſt.

It is poſſible likewiſe that this gland, which continues diſeaſed, though free from pain, may be ſo ſmall as not to be diſtinguiſhable by the touch; the patient therefore imagines herſelf cured: but I have frequently known inſtances where the gland, though it continued free from pain, has gradually increaſed, and in a few months been ſo ſwelled as to be perceptible under the finger. In this caſe, bleeding ought to be uſed in proportion to the fulneſs of the conſtitution, and in the arm or foot, as is judged neceſſary in regard to their *menſes*. Likewiſe bathing, and the uſe of mild diſſolvents mixed with gentle purgatives, have often been ſucceſsful in diſperſing the ſwelling of theſe glands. To theſe remedies, ſome propoſe to add the uſe of vulnerary and reſolvent cataplaſms, in order to excite a motion in the obſtructed fluids; but I have ſeveral times tried this method without ſucceſs; on the other hand, I have found great benefit from the application of a ſwanſkin conſtantly applied, which will always preſerve a warmth in the part. Sometimes the tumor has been diſperſed, at other times only the growth of the gland has been retarded, and the tumor remained indolent. If, after a time, we find no further enlargement of the gland, we ſhould lay aſide the uſe of medicines, as by continuing them they would be liable to impair the conſtitution.

When a *ſchirrus* is once arrived to a certain degree of ſize and hardneſs, we have no medicines ſufficiently powerful to diſſolve it. If the patient is only incommoded by its weight, it may be left to itſelf. But if it increaſes, ſurgery affords no other

other remedy but extirpation, and where that is practicable, we may be aſſured of ſucceſs. I would alſo propoſe it where the *ſchirrus* becomes painful, ſince the *cancer* is then but beginning, and provided the operation is not delayed, we may hope for a perfect cure. Nay, we may proceed to the extirpation even when the *ſchirrus* becomes a confirmed *cancer*, when painful, and broke; though I muſt freely own we can hardly hope for ſucceſs from it. I do not deny that the wound may be healed, but the diſeaſe will almoſt certainly return; and the diſcredit this will bring upon the operation, may diſcourage and hinder many patients from venturing upon it, though the circumſtances of their caſes give no room to apprehend a relapſe. Nevertheleſs, as there is abſolutely no other remedy, and extirpation, even if there ſhould be a return of the diſeaſe, may prolong the patient's life, it might not be amiſs to propoſe it; giving at the ſame time ſuch a prognoſtic of the event, as may ſecure both the ſurgeon and his profeſſion from reproach, if a return ſhould enſue.

Of th. operation for the cancer.

SUPPOSING a ſchirrous or cancerous tumor either in the upper or lower lip, we muſt cut it out and re-unite the two portions of the divided lip by ſuture, in the ſame manner as will be directed in the hare-lip. See alſo my *Obſervations*. If it is in any other part, it muſt likewiſe be intirely eradicated by an operation, if its ſituation will admit of that ſafely. Suppoſe the ſchirrous tumor in the breaſt, affecting a gland of a greater or leſs ſize, moveable within the adipoſe ſubſtance, and

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not adherent to the pectoral muſcle, we may be well aſſured that there is no other diſeaſed gland in the neighbouring fat, if the adipoſe ſubſtance is not harder than the reſt of the breaſt; and in ſuch a caſe we are only to extirpate the ſingle gland that is ſchirrous, without any injury to the other part of the breaſt; and this may be done in the following manner:

The patient having been prepared by bleeding, purging, and a proper regimen, for ſome days, ſhe is to be ſeated in a chair, and her hands held faſt by two aſſiſtants. Then with a longitudinal inciſion of a ſufficient length, I divide the ſkin and fat to the gland. The gland being thus laid bare, I fix it with a double errhine or hook, which I give into the hand of an aſſiſtant; I then with my fingers diſengage the gland as much as poſſible from the fat lying about it; and what could not be ſeparated by that means, muſt be taken off afterwards by the knife, and with it any part of the fat that may be ſuſpected to have ſuffered by being contiguous to the tumor.

There is ſeldom any hæmorrhage that requires us to uſe a ligature, ſo that it is generally ſufficient to dreſs the wound with dry lint ſupported with compreſſes, and a bandage round the body, applied ſo moderately tight as not to hurt the breaſts by compreſſion. After ſome hours it would be proper to take off the compreſſes, and ſoften the lint with *ol. hip.* for having lain in the coagulated blood and become dry, its hardneſs might be liable to hurt the breaſt, and occaſion a longer continuance of the pain, or perhaps bring on an inflammation.

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The first dressing should remain on three or four days, at the end of which time they are so moistened by the discharge as either to fall off of themselves, or be removed without pain. The wound is then to be looked upon as a simple wound, and dressed according to its different appearances.

When the obstruction extends throughout the breast, the whole must be taken off. The patient being prepared, and placed in the manner as before directed, the arm on the side affected must be kept at some distance from the body, that the pectoral muscle may be a little extended. If the swelling is large, an assistant should support it and keep it steddy with his hands; but if no hold can be taken of it by this means, the operator fixes it with the *Helvetian* forceps, which he gives to an assistant to hold. He then takes a long *bistory*, or for want of that, a razor fixed in its handle, and makes an incision into the sound part of the skin and fat above the tumor. This incision should be three or four inches long, and carried as deep as the pectoral muscle. Immediately he introduces three or four fingers, and passes them between that muscle and the distempered breast, which he may do very easily, as they separate without any trouble; and thus there is nothing left to cut but the skin, which is done with the same *bistory*, by carrying the incision round the tumor. If any adipose substance has escaped the incision, which by its hardness seems obstructed, it must be fixed with an errhine or the fingers, and be extirpated with the knife or scissars; and to do this the more easily, the pectoral muscle must be relaxed by bringing the arm a little nearer the body.

 AFTER

After having extirpated this fat, we sometimes find an obstructed gland situated near the axillary vessels; which we must be careful not to leave behind, as it might give rise to a fresh *cancer*. We might extirpate this by incision, but not without danger of opening some vessel arising from the trunk of the *arteria axillaris*, and occasioning an hæmorrhage that would be very difficult to stop; and therefore, to extirpate it more safely, the operator fixes it with an errhine that is to be held by an assistant, whilst he makes a ligature with a double-waxed thread behind the gland, which he ties with the fat that involves it.

If any considerable vessel should bleed during the performance of the operation, an assistant lays his finger upon it till the operation is over, and the blood, which springs out sometimes from several arteries, is then to be stopt. The patient frequently faints, and the hæmorrhage stops by that means: in which case she must be laid in a supine posture till she comes to herself; and if the bleeding returns, it must be suppressed either by making a ligature upon the vessel, or by the application of a small pledget dipt in styptic water.

The wound is afterwards to be dressed with dry lint supported by compresses and a proper bandage, applied loosely. A large roller passing several times round the body would be improper, as the pain already obstructs respiration, and such a bandage, with any degree of tightness, would obstruct it much more. Besides, it sometimes happens that after some hours the wound bleeds, and it would be troublesome to remove this bandage; it is better therefore to keep on the dressings by passing a napkin round the body and fastening it with pins. The appearance of blood

on the linen, which often happens ſoon after the operation, may oblige us to take off the dreſſings in order to ſtop a freſh hæmorrhage; and it may be done without difficulty by the application of a pledget of lint dipt in ſtyptic water.

After ſome hours the dreſſings begin to be moiſtened with a reddiſh diſcharge, but muſt be left on till they are ſufficiently ſoftened to admit a change of the compreſſes, without moving the lint that ſticks to the wound.

The firſt dreſſing ſhould remain on for four or five days; and in order to remove them without giving pain, the lint ſhould be covered on the third day with linen rags dipt in melted lard. This ſoaks ſufficiently into the lint to make it come off eaſily, and ſerves inſtead of other dreſſings till it all looſens and ſeparates together. The ſore is then to be looked upon only as a ſimple wound, and to be treated as ſuch till it is healed.

Where the operation has been performed after the tumor began to grow carcinomatous, it has been often known to return, either at the middle or edges of the wound, when the diſcharge leſſened. I have made uſe of ſtrong cauſtics in theſe caſes, but to no purpoſe; for before the eſchar that was formed by the cauſtic had fallen off, it had produced more calloſity than we had deſtroyed. Sometimes theſe freſh ſwellings have been extirpated by inciſion, but others have appeared; and the ſame thing I have known to happen after the operation, when the cancerous tumor adhered to the pectoral muſcle. If you cured the patient, the diſeaſe returned in about a twelvemonth. Amongſt the many inſtances I could bring to prove this, I ſhall give the following one; which may be relied upon.

A LADY

A LADY of fifty years of age had a cancer in her left breaſt that began to ulcerate: ſhe had been afflicted with it eight years, and it was grown ſo large as to weigh, when ſeparated from the body, between ſeven and eight pounds. It was of a deep red colour, hard, and attended with ſome pain. A gangrene ſeized it, and in two days it ſeparated and fell intirely off. The hæmorrhage was ſo great as to wet through the patient's bed, and run upon the floor. This happened in the night, and the next morning, when I was ſent for, I found a wound that appeared black, almoſt round, and about nine inches in diameter. The hæmorrhage was ſtopped, but the patient was ſo weak, that it was neceſſary to think rather of reviving her than having recourſe to any evacuations. I dreſſed the wound, and in four or five days, it digeſted kindly, and had a very good appearance. I continued to dreſs her five weeks, in which time the edges of the wound began to draw in, new fleſh granulated, and the ſore ſeemed ready to cicatrize entirely, being at moſt not above an inch in diameter. The whole habit appeared to be in a good condition, and nature of herſelf ſeemed to have effected all that could have been done by art; but the ſcene ſoon changed, for in the middle of the wound there aroſe a ſmall hard tumor, which gradually increaſing, extended to the cicatrix; and in leſs than a month the tumor appeared again almoſt in the ſame ſtate as it was in before the gangrene. About ſeven or eight months afterwards the patient died.

IT is certain that nature had, by the gangrene, done all that art could have effected by an operation, and the hæmorrhage had unloaded all the veſſels about the tumor, of which the good con-

dition of the wound for five weeks was a convincing proof: yet fresh cancerous swellings appeared in the middle of the wound when it seemed just ready to cicatrize; and as the local disorder could not be regarded as the cause, we must attribute this relapse to the morbid disposition of the fluids in general. In these cases, therefore, we can only propose such a regimen as may correct and soften the vitiated fluids, and prevent them, if possible, from becoming acrid, as they generally do while they are confined in the tumor. It will be unnecessary for me to give particular directions about this regimen, as that belongs to the physician's province.

Of disorders of the breast requiring an operation.

Every preternatural collection of a fluid in the breast has been ranked by authors under the general name of *empyema*. But as this fluid may be either diffused upon the diaphragm, or contained in a *cystis*, so as not to press upon that muscle, I think the term *empyema* should be applied only to the first of these cases.

Of the Empyema.

The *empyema*, then, is a collection of a fluid in the breast, which presses on one side of the diaphragm. If there is a collection on both sides, there are two empyemas. This disorder may proceed either from an internal cause arising from some previous disease; or an external cause occasioned by a wound: according, therefore, to the different causes which produce the *empyema*, the extravasated fluid may be water, chyle, aliment, blood, or *pus*. A co-

A COLLECTION of water may be the effect of a colliquative disposition of the blood, and if so, may accompany the *ascites* or *anasarca*; but it more frequently proceeds from diseases of the lungs, and especially those which are not attended with an inflammation.

THE collection of blood may proceed from the rupture of some vessel in the breast; but this seldom happens unless from an *aneurism*, which, by being too much distended, bursts, and forms what is called a false *aneurism*. It may, and indeed most frequently does, proceed from a wound that has penetrated the breast. There never is an *empyema* of the aliment or chyle, unless from a wound received in the *thorax* which penetrates either the *œsophagus* or the *ductus thoracicus*.

THE *empyema* of *pus* may proceed from a penetrating wound of the breast, the opening of which is either too small or improperly situated, so as not to allow of a free discharge to the matter. It may be owing likewise to an inflammation in the external membrane of the lungs, or of the *pleura*. These inflammations, we know, terminate by resolution, gangrene, or suppuration: if they can be resolved, the patient recovers; if a gangrene ensues, he dies; and, if they terminate in a suppuration, there is a formation of *pus*. When the inflammation does not occasion an adhesion of the lungs to the *pleura*, the *pus* is diffused upon the diaphragm; if it has produced an adhesion, the *pus* is contained in a *cystis*; and by neglecting to discharge the matter, it breaks thro' the adhesion, falls upon the diaphragm, and then forms an *empyema*. I have known instances, even of abscesses in the liver, where the matter has penetrated the diaphragm and lodged itself in the breast; which

could not have happened unless the liver and diaphragm had become adherent to each other from an inflammation preceding the formation of the *pus*.

Signs. There are signs which discover a collection of a fluid upon the diaphragm, and others which indicate what kind of fluid it is. In the first class are the following, *viz.* a shortness of breath from the fluid filling part of the breast, and thereby preventing a free dilatation of the lungs. Secondly, expiration is more difficult than inspiration, because the diaphragm in the first of these actions is obliged to raise up the weight of the fluid that lies upon it, whereas that weight renders inspiration more easy. Thirdly, the patient, when he moves, sometimes perceives a fluctuation. Fourthly, if a collection be on one side only, and considerable, the breast is larger on that side than on the other, which proceeds from the ribs losing somewhat of their motion at every expiration, and being less depressed from the difficulty there is of performing that action. See my *Observations*, page 108. If the collection be on one side only, the patient is unable to lie on the other, unless the lungs adhere entirely to the *mediastinum* on the side where the collection is formed, which is a circumstance not easily to be discovered. See my *Observations*, page 108. We may be assured then that the existence of this sign proves there is a collection formed there, though the want of it is not an absolute argument of the contrary. As to the signs which indicate the kind of fluid that is extravasated, they are to be collected from the nature of the disorder that produced the *empyema*, and from the preceding and concomitant symptoms.

If the signs which demonstrate the collection of any fluid succeed diseases occasioned by a colliquation of the blood, or if they happen after those distempers wherein the lungs have been long affected, there is reason to judge it a collection of water; and it is generally attended with an inflation of the neck and face, and an œdematous swelling of the extremities.

If the signs of such a collection arise subsequent to the patient's receiving a wound in the breast, and he is subject to frequent faintings, there is certainly an extravasation of blood.

If there has been an inflammatory disorder in the lungs or *pleura*, attended with symptoms of suppuration in some part of the breast, as a fixed and violent pain, irregular shiverings, a violent cough, an acute fever, with an œdematous swelling at the place where the pain is felt, and the signs of a collection appear afterwards, we may venture to pronounce that the *empyema* is formed of *pus*. Thick, clammy sweats also constantly attend this case.

Prognostic. Our prognostic must be taken from the place where the collection is formed, the cause that produced, and the symptoms which attend it.

Every collection lodged in the cavity of the breast may be considered as incurable, unless some means can be found to discharge the fluid that forms it.

A collection of water, proceeding from the colliquation of the blood, is incurable unless the *crasis* of the fluids can be restored; and I doubt very much whether the patient could then be cured, by letting out the water, as the lungs in such a case will be considerably wasted on that

ſide where the collection was ſeated. I have found them upon diſſection not larger than a golden renet. The diſcharging of the water may indeed be a relief to the patient for ſome days, but this he will be ſoon deprived of by a freſh collection. When it proceeds from diſeaſed lungs, it will certainly prove mortal though the water ſhould be diſcharged, for the lungs will be found full of ſchirrous tubercles.

A COLLECTION of blood cauſed by a penetrating wound in the breaſt may be cured, if the bleeding veſſel furniſhes no freſh ſupplies.

THE *empyema* of *pus* ariſing from an abſceſs of the liver, is ſeldom curable, as the part from whence the *pus* ariſes is ſituated lower than any opening that can be made to diſcharge it, and conſequently is very difficult, if not impoſſible, to be healed from the bottom.

THAT which proceeds from a ſuppuration in the breaſt may be cured by an operation, if the lungs do not adhere to the *pleura*; but if they do, and if the *pus*, which was incloſed in a *cyſtis*, happens to be diffuſed upon the diaphragm, there is very little to be done in ſuch a caſe.

IF there is an *empyema* on each ſide of the breaſt, the misfortune is ſo much the greater, as there are two diſorders inſtead of one, which make it neceſſary to perform two operations. To conclude, this diſeaſe may be complicated with ſuch a multiplicity of ſymptoms, as to allow but a very indifferent prognoſtic.

CURE. The *empyema* may be cured by nature and by art, that is, each of theſe may happen to effect a cure. The *empyema* of water is what is ſuppoſed curable by the efforts of nature, not that ſpecies of it which proceeds from a diſeaſe of the lungs,

lungs, but that which arifes from the colliquation of the fluids. The water has fometimes returned into the circulation, and paffed off by urine, as we have before obferved in treating of the *afcites*; but inftances of this kind are very uncommon. As to the empyemas, of blood, *pus*, or chyle, the only method of removing them is by the chirurgical operation which takes its name from the difeafe. The affiftance of a proper diet ought likewife to be made ufe of, either to correct the prefent fymptoms or to prevent fuch as may enfue the operation.

THE operation confifts in making an opening into the breaft, fufficient to give paffage to what is diffufed upon the diaphragm, and to admit of conveying proper remedies. The neceffary preparations being made, the patient muft be placed in a convenient pofture both for himfelf and the furgeon. The moft convenient for the patient, who, from the nature of his diforder, is fubject to a great difficulty of breathing, is to be feated on the fide of his bed, with his legs hanging down, and his feet refting upon fomething firm. If he was to fit up in bed, he could not long continue in that pofture, as his difficulty of breathing would be increafed in fuch a fituation.

THE opening in the *empyema*, as well as in common abfceffes, muft be made as near as poffible to the moft depending part; and it is for this reafon that they advife the making it between the third and fourth of the falfe ribs, reckoning from below upwards, and about five fingers breadth from the *fpina dorfi*. This is termed the place of election. Authors fpeak likewife of a place of neceffity for the operation, which they defcribe to be at the part

 where

where the *pus* may be felt under the ſkin ; but as the matter in ſuch caſes is not diffuſed upon the diaphragm, I do not call this diſeaſe an *empyema*, but an abſceſs in the breaſt ; of which I propoſe to treat ſeparately, and therefore do not admit of any place of neceſſity in the *empyema*.

Having determined upon the place, I make an inciſion about three inches long with a ſtraight biſtory, which inciſion will cut the line of direction of the ribs tranſverſely; and with one or more ſtrokes of the knife I divide the ſkin, the fat, and the muſcles which cover the ribs, ſo that the fibres of the *latiſſimus dorſi* will be cut obliquely. If the patient is very fat, we may change this inciſion into a crucial one by dividing the two lips tranſverſely, that is, according to the direction of the ribs. I afterwards lay my fore-finger along the back of the biſtory, guarding the point of it with my finger, and I cut along the intercoſtal muſcles and the *pleura* in the interſtice of the ribs. If the fore-finger which lies on the back of the biſtory touches the edges of the two ribs at the ſame time, the inciſion will be exactly between both, and there will be no danger of dividing the intercoſtal artery which runs along the inferior edge of the upper rib. It is neceſſary to make the opening in the *pleura* near half an inch long, or we might be liable either to diſtend it, and thereby produce an inflammation, or even to ſeparate it from the ribs, by introducing the finger, tent or ſeton with the dreſſings.

The inciſion being made, we are to facilitate the diſcharge of the extravaſated fluid, either by properly inclining the patient's body, or by introducing a probe into the cavity of the breaſt in order to remove the lungs from the ribs ; and this

this ought to be done very expeditiously. If the matter that is to be discharged is of a thick consistence, as coagulated blood, it is proposed to dilute it by means of injections passed through the female *catheter*. But besides that this would be very difficult to do, it would require a considerable deal of time, and would also oblige us to leave that side of the breast too long open; which might be productive of very bad consequences. See my *Reflexions on Gun-shot wounds*.

It may be asked perhaps, whether it is proper to let out all the extravasated fluid at once? If there is a large quantity, which there generally is in most empyemas of *pus*, only part of it should be discharged at the time of the operation; as well to prevent the patient's fainting, as because the actions of the lungs on that side are suspended whilst the wound remains open. The patient therefore should be dressed as soon as possible, since we may be assured that what is left behind will afterwards gradually come away in the dressings. As the discharge is made thus by degrees, the patient will not be liable to be weakened by it; and in proportion as it passes out, the dilatation of the lungs will be more free, and respiration less obstructed.

Practitioners are not agreed about the dressings upon this occasion: some are for putting a linen tent into the opening, made flat, so as to be adapted to the figure of the wound, and blunt at the end, taking care likewise that it may not slip into the cavity of the *thorax*.

Others advise a seton, one end of which is to be introduced through the wound into the cavity of the breast, while the other end remains without. There are some again who cover the orifice

with a fine rag about half a foot ſquare, upon which they lay a pellet of lint that preſſes againſt the wound, and keep on the whole with thick compreſſes and a bandage round the body.

All theſe methods have their inconveniences. The tent, if it is made too thick, not only fills up the opening made in the breaſt ſo as to prevent any diſcharge, but likewiſe diſtends the intercoſtal muſcles and *pleura*; and yet it would be preferable either to the ſeton or pellet in an *empyema* of blood, if the veſſel from whence the blood flowed continued to furniſh freſh ſupplies: The reaſon of this is plain. The only means of ſtopping the hæmorrhage muſt be by the coagulated blood forming a clot about the mouth of the opened veſſel, which clot extends itſelf and paſſes even into the veſſel, and as long as it remains there the bleeding ceaſes. During this interval, the blood flows through the collateral veſſels; and the orifice of the divided veſſel, contracting itſelf, incloſes that portion of the clot which was formed between its lips, and the clot is by degrees divided into two; one part of which remains in the veſſel and ſtops the orifice, whilſt the other falls off by ſuppuration. It is neceſſary therefore that a tent ſhould be placed in the opening between the ribs, to confine part of the extravaſated blood within the breaſt, otherwiſe the clot not being ſupported would fall off before the mouth of the veſſel was cloſed, and the blood would iſſue afreſh. This tent ſhould be flat, ſoft, and of ſuch a ſize as to fill up the interſtice of the ribs without ſuffering a compreſſion. As to the ſeton, one end of which is deſigned to be in the cavity of the breaſt, it would be an uſeleſs, extraneous body, and might prove very prejudicial. The applica-

tion

tion of a pellet wonld not be attended with pain, but would ſuffer the breaſt to be emptied too ſuddenly, and the wound to re-unite too faſt, ſo that the muſcular fibres of the *latiſſimus dorſi* would in ſome meaſure cloſe it up; which might render the dreſſings painful, and ſometimes very difficult to be applied.

Upon the whole then, there is no general rule to be given in this caſe; but the tent and pellet are to be uſed occaſionally, according as circumſtances vary. At the firſt dreſſing, indeed, I think, the tent ought always to be uſed, taking care to make it very flat, ſince it would otherwiſe (eſpecially as it ſwells and grows larger by imbibing the diſcharge) obſtruct the motion of the ribs. By this method we have a greater command of the opening; and therefore I would adviſe it to be made uſe of as long as the diſcharge continues, or whilſt injections are neceſſary, which ought to be quite avoided, unleſs there are very urgent reaſons for their uſe. When the diſeaſe is ſo far removed as only to want the healing up of the wound, the tent would then be as an extraneous body, and the pellet is preferable.

As the *empyema* of *pus* proceeds from a ſuppuration formed in the ſame ſide of the breaſt, we muſt not wonder to find a certain quantity of matter in the breaſt at every dreſſing, though a great deal comes away; and the reaſon of this is, that, ſince the operation, the matter ouzes from all the ulcerated parts, and will continue to do ſo in ſome degree till theſe are cicatrized.

The *empyema* of *pus* is the only one where we can aſſiſt nature by the uſe of injections; and here it may be proper to make uſe of them to cleanſe and deterge the internal ulcers, and to convey (at

leaſt

leaſt for ſome time) ſuch remedies as are judged neceſſary. But obſerve that theſe injections ſhould be made very ſeldom, ſince upon every occaſion of this kind the breaſt is kept open, which, as the lungs on that ſide are not dilated while the breaſt is thus expoſed, may produce an obſtruction there.

The dreſſings are to be applied as ſoon as ever the injection is thrown in, which will gradually come away afterwards through the wound. If there is an *empyema* on each ſide of the breaſt, and the caſe not very urgent, we ought, for fear of exhauſting the patient's ſtrength, to perform the two operations at the diſtance of a day or two from each other.

If an *empyema* is formed on each ſide of the breaſt, great care muſt be taken not to leave the two wounds open at the ſame time, as it might endanger the patient's being ſuffocated. To prevent this, let an aſſiſtant, whilſt the orifice of one ſide is open, preſs with his hand upon the dreſſing of the other ſide, that the air may not paſs through the wound, and get in between the lungs and the *pleura*.

Of abſceſſes in the breaſt.

After having treated of the *empyema* as a diſeaſe proceeding from a collection of *pus*, and preſſing upon the diaphragm, I come now to ſpeak of the abſceſs formed in the breaſt between the lungs and the *pleura*; and which, if not timely opened, degenerates into an *empyema*. In doing this, I propoſe to begin with theſe abſceſſes from their riſe, and to follow them in their ſeveral gradations to their cure; but previous to this, as the know-

knowledge of the natural ſtate of the *pleura* may lead us to form a right judgment of its morbid condition, I ſhall remind the reader that this membrane lines the whole cavity of the breaſt, and is attached to its internal ſurface by a cellular ſubſtance; that it likewiſe forms the *mediaſtinum*, and furniſhes the lungs with their external coat.

As the *membrana adipoſa* is the general ſeat of a *phlegmon*, ſo the membranous and aponeurotic parts are particularly ſubject to an *eryſipelas*. The *pleura* therefore, like other membranes, is ſubject to an *eryſipelas*, which may afterwards degenerate into a *phlegmon*, and produce pleuriſies, peripneumonies, &c.

We often find theſe diſeaſes give way to a proper diet, the inflammation terminating by reſolution; but the cure, though ſeemingly perfect, does not always prove ſo in reality. Experience teaches us, that inflammations often produce preternatural adheſions of one part to another when they come into contact, and that the lungs ſometimes contract ſuch adheſions with the *pleura*; adhering either to that part of the *pleura* which lines the ribs, or to that which lines the *diaphragm*, and ſometimes to the *mediaſtinum*; in conſequence of which, theſe patients, who otherwiſe ſeemed cured, have a ſlight pain, and eſpecially when they cough, at that part of the breaſt where the inflammation was greateſt: this pain is certainly the effect of theſe adheſions, and it muſt neceſſarily be increaſed by the force of coughing and a *plethora*. If the bodies of the dead were as ſuperſtitiouſly regarded in all countries as they are in ſome, where they are not ſuffered to be opened, we ſhould have been ignorant of theſe adheſions, and of the ſtate wherein theſe membranes remain

after their ſeeming cures juſt mentioned. But we have happily ſhaken off theſe prejudices; and, by inſpection into the bodies of the dead, we learn, that the membranes, when attacked with any conſiderable inflammation, continue red, hard, and of a preternatural thickneſs, unleſs the reſolution be perfect. I have ſeen inſtances of this where the membranes have been near a quarter of an inch thick, which is very extraordinary, conſidering the natural fineneſs of the texture of theſe parts. We may reaſonably ſay therefore, in this caſe, that the diſeaſe has not terminated by reſolution, but by induration; that is, the obſtructed fluids are inſpiſſated, and the veſſels which contained them having loſt their ſoftneſs and flexibility, are alſo grown thick, and have acquired a degree of hardneſs almoſt equal to a calloſity. And yet, though theſe membranes may be looked upon as diſeaſed, there is a circulation of the fluids in them for their nouriſhment, which circulation is more or leſs free according to the degree of the induration. It is likewiſe obſervable, that though the external membrane of the lungs and the *pleura*, when obſtructed and thickened thus, ſeem by their adheſion to make but one membrane, yet it is eaſy to diſtinguiſh them from one another, and to ſeparate them by diſſection. As there is not however that freedom in the circulation as is natural, there often happens an entire ſtoppage of the fluids in ſome particular part, which occaſioning ſome of the obſtructed veſſels to burſt, there neceſſarily enſues a ſuppuration.

The abſceſſes here meant are ſometimes formed in the cellular ſubſtance of the thickened *pleura*, but I have met with them oftener between the mem-

membranes that were become adherent. See my *Obſervations upon the diſeaſes of the breaſt.*

THESE abſceſſes ought to be looked upon as real phlegmons; for the *pleura*, as I juſt now obſerved, having become red and thickened, and all the lymphatic veſſels which moiſtened it before being now become ſanguinary veſſels, it cannot be reckoned as a membrane: beſides, the ſymptoms which either precede or attend the formation of *pus* in theſe caſes, are almoſt ſimilar to thoſe which accompany phlegmons formed in the *membrana adipoſa*, except that the ſuppuration of phlegmons in the adipoſe ſubſtance is formed much quicker than the others; and the reaſon of this is very evident. In phlegmons that are formed in the adipoſe parts, the obſtructed tubes remaining, as in their natural ſtate, fine and thin, eaſily break, if diſtended in their diameters by the inflamed blood which is ſtopped there, and ferments; but here the tubes, being grown hard and callous give a reſiſtance to the circulating fluid, which likewiſe paſſes thro' them with more difficulty as it is become almoſt of the conſiſtence of a jelly. If therefore a rupture happens in any of the obſtructed veſſels, it is made with greater difficulty, and after a longer time; and for this reaſon it is that thoſe abſceſſes are a great while in forming, and frequently are not in a condition to be opened till above half a year after the diſeaſe began; whereas the other phlegmons begin to appear, come to ſuppuration, and are fit to be opened in a week, and ſometimes ſooner.

SIGNS. The ſymptoms that attend the formation of *pus* between the lungs and the *pleura* muſt ſerve as indications in this caſe; and, in order to furniſh an exact account of theſe, it would be requiſite to give inſtances of the ſeveral diſeaſes that

have

have terminated by ſuch abſceſſes; but this may be ſeen in my *Chirurgical Obſervations*, together with the ſigns that characterize theſe abſceſſes, and enable us to diſtinguiſh them from the *empyema*. To avoid repetitions, therefore, I ſhall refer my reader to what I have therein mentioned.

PROGNOSTIC. This diſeaſe, which at its beginning fell under the phyſician's care and direction, is now changed, and become a chirurgical caſe. When the *pus* is once formed, many circumſtances ſerve to direct our prognoſtic, if we can be properly informed of them; ſuch as the extent of the adheſion, the part of it in which the matter is formed, the ſtate of the patient in general, and of the lungs in particular. If the extent of the adheſion is ſmall, of which we may judge by learning the place where the firſt pains were felt, and that whereof the patient now complains; and if at the ſame time the abſceſs is ſo ſituated that it can be opened, we may hope to effect a cure, provided the inciſion be made ſoon. But if the adheſion is in a part that is beyond the reach of chirurgical aſſiſtance, the abſceſs will either penetrate the lungs, and the quantity of *pus* will ſooner or later kill the patient, or it will paſs into the cavity of the breaſt; and being expanded upon the diaphragm, the patient will be in equal danger of his life, though we ſhould perform the operation of the *empyema*.

IF the adheſion is very extenſive, the cure is doubtful, even if an opening be immediately made into the abſceſs, as there may be other abſceſſes within the extent of the adheſion, which are out of our reach.

SUPPOSING the adheſion is not very conſiderable, yet if the opening of theſe abſceſſes be delayed, the *pus* will gradually break through the

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adhesion in some part or other, and diffusing itself upon the diaphragm will form an incurable *empyema*, even though the *pus* should be discharged by the operation. See my *Observations*, page 101.

The bad state of the patient, worn out by a lingering distemper, may be another direction to determine our prognostic, but ought not to prevent our procuring a discharge for the *pus*, if there is an indication for it, and it be practicable.

Lastly, it is very difficult to discover exactly what condition the lungs may be in. It is impossible they should not have been affected by the inflammation when the abscess was forming, and the symptoms that attended the formation of the *pus* may probably have very much injured them. We may judge in some measure of this by the respiration, according as it is free or obstructed, painful or otherwise; also by the bloody, purulent, frothy, or thick expectorations; by the cough, as it is more or less hard and troublesome, &c. and by all these symptoms jointly considered.

Cure. It is impossible in these abscesses to feel the matter fluctuate under the finger; as the intercostal muscles, the ribs, the *membrana adiposa*, and the skin lie between, and it is very seldom that the matter ever wastes or destroys any of these; though I have seen two instances where this has happened. See my *Observations*. A serous fluid may indeed ouze from the abscess, and passing through the intercostal muscles may insinuate itself into the cells of the *membrana adiposa*; in which case we find a preternatural thickness in the teguments, which upon the least increase retains an impression of the finger. It is there the opening ought to be made, as that is the part where

you will find the *pus*. It is true indeed this is not the place that is at present most painful, but it was so during the height of the inflammation which caused the adhesion, and ceased to be so only after the parts affected had come to suppuration.

The same method must be used in opening this abscess as in performing the operation of the *empyema*. An incision must be made through the teguments and the muscles lying immediately under the skin, according to the line of direction of the body, and the intercostal muscles must be divided according to the direction of the ribs, with the same precautions as were before directed in performing the operation. There is no other difference but in the part where the incision is to be made, which we are directed to by the slight *œdema* before taken notice of; and this is what authors, who have not distinguished an *empyema* from these abscesses, have termed the place of necessity.

The manner of discharging the *pus* differs in this case from that of the *empyema*. We may let it all come away at once without being afraid of leaving the breast too long open, for the air being prevented by the adhesion from penetrating, as in the *empyema*, between the *pleura* and the lungs, they will be dilated on this side in inspiration. We may also use injections here, as we have no other means of conveying the proper remedies into the cavity of the abscess. There is one case only where the use of them would be improper, and that is when the patient has lately expectorated matter, since this shews that the *pus* has got into the lungs, and injections would be liable to bring on violent coughing. See my *Observations*,

vations, page 116. In the courſe of the dreſſings there is ſometimes a larger diſcharge of *pus* than at others, nor need we be ſurpriſed at this. Several ſmall abſceſſes having been formed at ſome diſtance from one another, and the matter contained in each abſceſs having contributed to ſeparate the adheſion, they united and formed the abſceſs which we opened. If more matter comes away afterwards than is uſual, it is undoubtedly owing to the contents of a new abſceſs, which has ſeparated ſome other part of the adheſion, and opened itſelf into the firſt. The wound, in ſuch caſes, generally remains fiſtulous, the opening made by the laſt abſceſs not being proportionable to the largeneſs of its bottom, and it being impoſſible to throw in proper injections either to make it ſuppurate properly or to deterge it.

THERE is an account in my *Obſervations* of ſeveral diſorders of this kind; ſome of which were cured, in others the patients died. In the cure of the former, and by the relation of the circumſtances which occurred upon opening the bodies of the latter, you may meet with proofs of what I have advanced.

I HAVE been the more particular in explaining this ſubject, as I do not find any who have written before me have thoroughly conſidered it.

Of the QUINCY.

THE quincy is an inflammation of thoſe parts of the throat that are ſubſervient to reſpiration, ſpeech, and deglutition: it may affect therefore that portion of the *trachæa* which ex-

tends from the *larynx* to its firſt diviſion, as alſo the *larynx* itſelf, the *pharynx*, the tonſils, the arch of the palate, the *uvula*, and the membranous and cellular ſubſtance that is ſituated between the adjacent muſcles; ſo that the muſcles are included amongſt the number of the parts liable to this inflammation.

Authors have divided the different ſpecies of quincies into true and falſe; comprehending in the firſt claſs thoſe quincies that affect the *trachæa*, the *larynx*, and *pharynx*; and in the latter, thoſe which affect the tonſils, the arch of the palate, the *uvula*, and the muſcles.

This inflammation is either lymphatic, eryſipelatous, or phlegmonous, and therefore differs not from inflammations of any other parts; but it frequently produces ſymptoms of much more conſequence, and which require the moſt ſpeedy relief, as it interrupts, and may even quite obſtruct, reſpiration and deglutition. If the arm, leg, and many other parts are inflamed, their actions may be ſuſpended without much danger; but reſpiration and deglutition being neceſſary to life, relief muſt be more ſpeedy in a quincy than is abſolutely requiſite in reſpect to moſt other inflammations.

Without either deviating too much from or exactly following the diſtinctions which authors have made of this diſeaſe, I ſhall proceed to examine what diſorders they may produce in each of the parts affected; but previous to this I muſt obſerve, that it is almoſt impoſſible any one of theſe parts ſhould be inflamed without ſome of the other ſuffering more or leſs at the ſame time. Anatomy teaches us, that the *larynx*, the *pharynx*, and the tongue, have a great number of muſcles

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for the performance of their ſeveral functions; that theſe parts and their muſcles are joined together by a membranous and cellular ſubſtance, which in ſeveral places is furniſhed with glands and fat. It is very natural therefore, that the one ſhould participate of the diſorders of the others; for being contiguous, and the muſcles that conduce to their motion either being almoſt common to all, or acting conjointly, one of them cannot be moved without ſome other being in action at the ſame time.

The firſt kind of Quincy.

THERE is one ſort of quincy, which, two or three days before death, attacks almoſt all perſons whoſe ſtrength has been exhauſted by large evacuations: it is a ſort of hoarſeneſs, attended with ſome degree of pain when they ſpeak or ſwallow, proceeding from a dryneſs of the internal coat of the *trachæa* and the *larynx*: but it is needleſs to enlarge upon this diſeaſe, as it is the ſign of an approaching death.

The ſecond kind of Quincy.

THIS ſpecies of quincy may probably prove ſlight, there being only a ſimple obſtruction in the glands that are ſituated between the membranes of the *trachæa* or the *larynx*, and is occaſioned by having imbibed cold air in breathing; drinking too cold liquors, though they do not enter into the *larynx*, may likewiſe produce the ſame effect, by paſſing over the *epiglottis*. Cold ſtops the mouths

of the excretory ducts of these glands, and the fluids which they secrete to keep the passage constantly moist, is thereby inspissated, and causes an uneasy dryness. From this dryness proceeds a hoarseness, and a slight pain, which in some measure obstructs deglutition. These symptoms continue for some days, till the obstructed fluid, dissolving by a kind of digestion, runs into the cavity of the *trachæa* or the *larynx*, from whence it is spit up. In order to promote this digestion, which is the only means of curing the hoarseness, the patient should breathe a warm air, and sometimes inhale the steams of warm water, which serve as a fomentation to the internal part of the passage. A plentiful use of emollient and warm drinks may also be serviceable, and, what is very essential in this case, the patient should be enjoined a perfect silence.

The third sort of quincy.

If the internal membrane of the *trachæa* or that of the *larynx* are inflamed, this inflammation, which is of the erysipelatous kind, causes a disease most violent in its nature and very rapid in its progress; and is usually indicated by the following symptoms.

Signs. This swelling being seated in the canal affords no external appearance, but the patient feels a burning heat with a very violent internal pain, which hinders his swallowing. This pain is greater in inspiration, because the passage is then dilated, and the patient cannot breathe easily unless when sitting. As the disease increases, respiration grows very short and difficult, the voice is shrill, and the fever extremely violent, ac-

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companied with an ardent thirſt. In ſhort, all theſe ſymptoms increaſe ſo ſtrongly and ſo ſpeedily, that the inflammation may quickly terminate in a gangrene. The whole internal membrane of the upper part of the *trachæa* has been known, in theſe caſes, to ſeparate, and, in a violent fit of coughing, come away in one piece; but inſtances are much more frequent of the patient's dying very ſuddenly, notwithſtanding the utmoſt care has been taken.

The fourth kind of Quincy.

THE inflammation may ſeize on the *larynx* and the *trachæa* both externally and internally, and by a gradual increaſe extend to the cellular and adipoſe ſubſtance, lying between the muſcles of the tongue, and thoſe of the *os hyoides*; in which caſe the tumor that before was only eryſipelatous now becomes phlegmonous. To the ſymptoms already mentioned, are added a ſwelling of the throat, and ſometimes a redneſs appearing on the outſide: the patient can hardly ſwallow his ſpittle, for the muſcles of the tongue, being deprived of their action, cannot apply it to the palate. The tongue hangs partly out of the mouth, the eyes ſparkle, and the face is bloated: in ſhort, the organs of ſight, hearing, ſmelling, and taſting, and even the brain itſelf, may be affected by a compreſſion of the jugular veins, through which the blood paſſes with difficulty. But what moſt fatigues the patient, and alarms the by-ſtanders, is the great difficulty of breathing, which hinders the blood from circulating freely in the lungs. This ſymptom increaſes viſibly, and ſometimes ſo faſt as to require an operation, for the immediate relief of the

patient, though not otherwiſe relative to the cure of the inflammation.

Causes. The bad diſpoſition of the fluids, overheated by ſpiritous liquors or food of an heating nature, may produce an inflammation in theſe parts as well as in others, excluſive of any external cauſe; though external cauſes indeed may determine the defluxion to this part; as they may likewiſe do even when the fluids are in a good ſtate.

Of theſe cauſes the moſt uſual is the paſſage of a cold moiſt air through the *larynx*. The noſe is a ſort of labyrinth, deſigned by nature to warm the air before it enters the lungs. But many people breathe only through the mouth, eſpecially when they hollow, ſing loud, perform any violent exerciſe, or when they walk or run very faſt. At ſuch times the air paſſes cold through the *trachæa* into the lungs, and from thence often proceed hoarſeneſſes, violent rheums, peripneumonies, &c. the cold air in thoſe parts ſhutting up all the pores through which the perſpirable matter ought to paſs, and inſpiſſating the fluids ſecreted by the glands. The ſame cauſe that produces the inflammation in the lungs, may occaſion it equally or rather ſooner in the *larynx*, as this is the part firſt affected by the air at the time of inſpiration. Drinking very cold liquors, as was before obſerved, and likewiſe blows, compreſſions, wounds, &c. may occaſion the like inflammation.

The fifth kind of Quincy.

The quincy that ſeizes upon the *pharynx*, and is confined to that only, does not occaſion ſuch

such, bad symptoms as that of the *trachæa* and the *larynx*.

SIGNS. In this case, though the patient breathes with ease, he swallows with difficulty, and sometimes not at all; what he attempts to swallow either coming out at his nose, or falls partly into the entrance of the *larynx* (the free motion of the *epiglottis* being suspended) and occasions violent fits of coughing. The fever is proportionable to the degree of the inflammation, and the thirst to the difficulty of swallowing.

CAUSES. The internal causes of this disorder are the same with those of any other inflammation, and it may arise also merely from external causes. Little bones, or the splinters of broken ones, pins or needles got accidentally into our food, also fish-bones or other extraneous bodies, may happen to stick in the *pharynx* of those who do not sufficiently masticate their food, and may produce excoriations. Drinking very cooling liquors when we are hot, may close the pores there and bring on an obstruction of the glands, which are very numerous in that part, and stop the perspirable matter which before was constantly passing though in great quantity; very sharp liquors also may corrugate and irritate the coats of the passage. Thus we see that inflammations in these parts may be produced by various causes; and if the disorder spreads to the *trachæa*, the *larynx*, the cellular substance, and the fat lying between the muscles of the tongue and those of the *os hyoides*, such other symptoms will appear as we have described in the quincy of those parts.

PROGNOSTIC. Our prognostic is not to be taken altogether from the nature of a disease, but also from the particular parts affected, and the

progrefs that the difeafe either has already made or may hereafter make.

Every inflammation is dangerous, wherever fituated, fince it may increafe in fuch a manner as to deftroy the part affected, if not the patient's life. Every quincy therefore is dangerous, but that which is moft fo, is the quincy which feizes on the *trachæa*, the *larynx*, or the neighbouring mufcles; for in thefe cafes, the inflammation may kill the patient, either by bringing on a great difficulty of breathing, or by entirely clofing up the paffage of the air before it rifes to its height. Upon thefe occafions then, we can make but a very doubtful, or rather difcouraging prognoftic, and the more fo, as the operation of *bronchotomy*, which is the only means we have left of removing this laft fymptom, is of no fervice in remedying the primary caufe of the diftemper.

This operation, by which we make an opening into the wind-pipe, is not in itfelf dangerous, as is evident by the cures which are often made on people who in a fit of madnefs have cut their throats, and fometimes half divided the *trachæa*: it is not therefore the operation which endangers the patient's life, but the original inflammation, which may either terminate in a gangrene or fpread to the lungs.

Cure. In thefe cafes, we are not fo much to confult the ftrength of the patient as the nature of the difeafe, in order to ftop its progrefs.

The plentiful ufe of cooling and emollient liquors, though they are indicated as ufeful, yet are only fo in the beginning of the diftemper: for when it increafes, the patient is rendered unable to fwallow, and confequently no regimen can be prefcribed.

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GARGARISMS too at first may take place, but not afterwards, the patient being unable to raise his head, for fear of suffocation. The only remedies we can have recourse to then, are clysters, bleeding, and cataplasms. The first of these ought to be plentifully administered, if the posture wherein the patient is obliged to remain, will permit. They must be cooling and gently laxative, in order to procure such revulsive evacuations as may unload the suffering parts. The vessels also must be emptied by copious and frequent bleeding, particularly in the foot, as being in this case more revulsive; and this indeed is the chief remedy.

CATAPLASMS, by the warmth they communicate to the part, may relax the inflammatory tension and forward the resolution of the obstructed fluids. Let the throat therefore be embrocated with resolvent oils; as oil of lilies, camomile, &c. and afterwards emollient cataplasms applied, and frequently renewed to prevent their growing cold.

DURING the use of these remedies, the surgeon should carefully observe how the patient breathes; and, if he sees reason to apprehend him in danger of being suffocated, he must immediately have recourse to the operation of *bronchotomy*, to give a free passage for the air into the *trachæa*.

Of the operation of Bronchotomy.

To perform this operation, the patient must continue in the posture in which he breathes most easily; for bending back the head a little, as some authors advise, might possibly suffocate him. They propose likewise to divide the skin first, and then gradually separate the muscles that cover the

the *larynx*. This appears well in ſpeculation, but if the pain ſhould excite the patient to cry out, the motions thereby occaſioned might be of fatal conſequence. The operation therefore ſhould be done as expeditiouſly as poſſible. The neck being ſwelled and diſtended will make it eaſier than otherwiſe it would be, to divide the ſkin; but yet I ſhould chooſe to have it ſecured from ſlipping by an aſſiſtant placing his hand on one ſide of the *trachæa* whilſt the operator does the ſame on the other; but this muſt be done without much preſſure.

EVERY thing being ready, I make an inciſion in the ſkin according to the direction of the neck, beginning about half a finger's breadth above the inferior part of the cricoide cartilage, and continuing it according to the progreſs of the *trachæa*, I finiſh it towards the fifth or ſixth of the annular cartilages, varying ſometimes in this reſpect according to the length of the patient's neck. This done, with a ſecond and deeper cut, beginning a little below the *cartilago cricoides*, I lay bare the *trachæa* ſufficiently to diſtinguiſh with the finger the reſiſtance of its cartilages. The air diſtending the *trachæa* by the difficulty it meets with in paſſing, we may eaſily enter the point of the biſtory ſideways between the third and fourth ring, where we make a tranſverſe inciſion about half an inch long. Immediately I introduce into the wound of the *trachæa* a ſmall *canula*, conveying it either upon a probe or by itſelf.

THIS *canula* is made of ſilver or lead, very flat, and alſo blunt at its extremity, and of ſuch a length as not to reach the part of the *trachæa* oppoſite to the inciſion. It is furniſhed with two ears, through which we paſs a ribbon that goes round the neck and fixes it in the opening made

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in the *trachæa*. I then cover the wound with gauze, the texture of which is loofe enough to give paffage to the air, and yet fufficiently clofe to ftop any threads that might unravel from the linen that is put over it. Without this precaution they might be drawn with the air into the lungs, and excite a violent cough. This gauze is to be covered with a comprefs feveral times doubled, having an opening made in the middle of it, and wet with fome warm liquor. The whole is to be kept on by a circular comprefs with an opening in it likewife anfwering to the orifice of the *canula*. The air paffing freely through thefe apertures, the patient will breathe eafily; and this relief may conduce very much to abate the inflammation and the other fymptoms; for nothing caufes greater diforders in the whole animal fyftem, than a difficulty of breathing; befides the danger there is of the lungs by this means becoming obftructed. But yet, though the patient breathes freely, the inflammation, if it continues, requires the fame care as was before directed. When it is confiderably abated, which may be known by a remiffion of the fever, pain, and difficulty of fwallowing, the *canula* muft be taken out, and the wound left almoft entirely to nature, dreffing it only with a common plafter, kept on by a comprefs round the neck, and faftened moderately tight with pins. The incifion in the *trachæa* will foon clofe, and the cicatrix will cover it.

A fixth fort of Quincy.

THE inflammation that affects the arch of the palate, the *uvula* and the tonfils, though confined to thefe parts, occafions almoft the fame fymptoms

lancet, for large and frequent evacuations by bleeding are the moſt likely means to ſtop the progreſs of the diſeaſe, and probably to produce a ſpeedy cure. Cataplaſms gently aſtringent may likewiſe be uſefully applied round the neck. But if, in oppoſition to our endeavours, the inflammation ſtill increaſes, bleeding and the ſame remedies muſt be continued, with this difference only, that inſtead of the reſtringent cataplaſms we are to ſubſtitute ſuch as are emollient and reſolvent, by which means we often find the diſeaſe gives way and entirely goes off.

It ſometimes happens that the tonſils remain large, hard, and in ſome meaſure ſchirrous. The hardneſs may be diſperſed by the frequent uſe of gargariſms made with a decoction of emollient herbs, or with warm milk only; but as they generally continue rather larger than is natural, they may be afterwards ſubject to abſceſſes, which, unleſs they break of themſelves (as they commonly do) ſhould be opened.

This kind of quincy may terminate by ſuppuration two different ways, viz. either in an ulcer, or an abſceſs. If in an ulcer, it is formed either upon the tonſil itſelf, or on the ſides of the fleſhy arch. This indeed cannot be eaſily diſcerned till the ſymptoms are ſomewhat abated, when the patient is able to open his mouth. This ulcer is of greater or leſs extent, and the ſlough that covers it, is white, and more or leſs thick. We muſt endeavour to digeſt it off by frequently touching it with a mixture of ſyrup of mulberries and a few drops of ſpirit of vitriol; and as the ſlough ſeparates, the ulcer becomes red, deterges, and heals in a few days, being continually moiſtened by the *ſaliva*, which is of uſe in the cure.

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When the quincy terminates in an abfcefs, it is generally formed in the cellular membrane of the tonfil, and feldom in the body or fubftance itfelf. As foon as the *pus* is formed, the fever abates a little; yet the patient finds but fmall relief from this, becaufe of the fwelling and the great difficulty of fwallowing. Together with thefe he perceives a moft offenfive fmell of *pus*, though the abfcefs is not yet open: but when this fymptom arifes, it is probable the abfcefs will foon break: When it does, he fpits out the matter and is perfectly eafy. But fuppofing the abfcefs does not break of itfelf, if we can fee it, or feel it with the end of the finger, we may fpare the patient fome hours pain by introducing a lancet: and indeed we are fometimes obliged to do this on account of the violence of the diforder.

The lancet which we ufe upon this occafion fhould be of a fufficient length, being fixed in its fcale, and armed with linen wrapped round the blade, fo that only about half an inch of the blade is left bare. The patient's tongue muft be depreffed with a fpoon or a *fpathula*, upon which we conduct the lancet, and pafs the point of it into the abfcefs; but I think this incifion may be made more conveniently with the inftrument called *pharyngotomus*. When the abfcefs is opened, the throat fhould be often gargled with detergent and fub-aftringent decoctions; for though thefe do not enter into the cavity of the abfcefs, yet by the motions they excite of the mufcles of the tongue, of the *os hyoides*, and the *pharynx*, in gargling the throat, and fpitting, they comprefs the abfcefs on every fide, and fqueeze out the matter. The fame method may be continued for feveral days

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after the incision is made; for as the abscess could not be opened in its whole extent, some matter may still lodge there. To conclude, the cure of the abscess depends chiefly upon nature.

WHAT we call the tonsils are only a *congeries* of several conglomerate glands, united together by membranes. When these have been rendered schirrous, and afterwards have matter formed in them, the suppuration is performed with greater difficulty, and the symptoms are more violent; therefore, as soon as ever the matter is formed, the abscess should be opened.

Of the amputation of the uvula.

WE have seen, in speaking of the false quincy, that the *uvula* becomes inflamed as well as the fleshy arch of the palate, and that it is likewise enlarged and falls down. The frequent inflammations that happen in this part, though we succeed in removing them, occasion such a weakness of the *uvula*, that, being thereby rendered incapable to support itself, it falls down upon the *epiglottis* and seems as if it was elongated: nor is it improbable, from its whole texture becoming varicous, that it really is so.

BY the *uvula* falling down thus upon the *epiglottis*, it becomes very troublesome to the patient, who is continually attempting either to swallow or to raise up what he feels in his throat; but in vain, for it falls down again, and the same sensation is renewed.

THE only way of removing this complaint is by cutting off part of the *uvula*. In order to this, having seated the patient in a chair placed in a good light, with his head held fast by an assistant,

I direct him to open his mouth, and preſſing down the tongue with a pair of *forceps* of a ſufficient length, I take hold of the extremity of the *uvula* with the *forceps*, and immediately with a long pair of ſciſſars, cut off at one ſnip more or leſs of it, according to its length. There have been inſtruments invented on purpoſe for this operation, which will likewiſe anſwer the deſign. The hæmorrhage is inconſiderable, and ſtops by gargling the mouth with cold water and ſwallowing it down; and all that the patient need to do afterwards is to gargle it for a few days with warm wine, and the wound will heal.

The manner of cutting the frænum of the tongue.

The internal membrane of the mouth forms a kind of fold under the fore part of the tongue, to the middle of which it is connected, and makes what is termed the *frænum*. If it is ſmall, it does not obſtruct the motions of the tongue; but it ſometimes ties it down, and fixes it near the inferior *dentes inciſivi*, and in ſuch caſe hinders children from ſucking. This may eaſily be diſcovered by putting the little finger under the infant's tongue when it cries.

In order to cut the *frænum*, we fix the tongue with the end of the finger, and paſſing the branches of a ſharp pair of ſciſſars, which ſhould likewiſe be pretty large, and blunt at the point, on each ſide of the *frænum*, we cloſe the ſciſſars and divide the *frænum* at once. If we were to uſe a pair of pointed ſciſſars, we ſhould run the riſk of opening one of the ranular arteries which are ſituated under the tongue on the ſides of the *frænum*. To pre-

prevent the incision from growing up again, let a little fine salt be put under the tongue, which will excite such motions in the child's mouth as to hinder the re-union. The nurse should also be ordered to pass her finger under the tongue two or three times a-day. This small wound requires no dressings, but will heal of itself.

OF THE

HARE LIP,

AND THE

TWISTED SUTURE.

THE hare lip is a fissure or division in one of the lips, which is formed in two parts like the upper lip of a hare; and the same sort of division is sometimes found in the nose, ears, and eyelids.

This deformity may be either natural or accidental. When we extirpate a cancer or a schirrous tumor from the lip, it thereby becomes a hare lip.

Nor is it barely a deformity, but likewise a great inconvenience, as the lips serve to articulate the voice, conduce likewise to mastication, and confine the *saliva*, which would otherwise run out of the mouth. No time therefore ought to be lost in applying a remedy.

It happens here, as in some other diseases, that nature can do nothing towards their removal till we have put her into a way of acting, so as to unite

unite the parts which are ſeparated. In order to this they muſt be brought into contact with each other, and preſerved in that ſituation till the nutritive juice has effected their union.

NOTWITHSTANDING the inconvenience of a hare lip, authors object againſt our attempting to cure it in children, becauſe their crying will either break the ſtitches or tear them through the lip. This reaſon, at firſt, appears plauſible, but is contradicted by experience. I have performed the operation on children of all ages, and by ſupporting the ſtitches with the dry ſuture, have always ſucceeded. They forbid it likewiſe where the patient has the ſcurvy, the evil, or the venereal diſeaſe, till they are firſt removed; but theſe diſtempers are no obſtacles to the cure, ſince limbs have been amputated from perſons under ſuch circumſtances, who have done very well in a ſhort time. Another objection they make to it, relates to women who are not regular in their *menſes*; but why they ſhould raiſe this objection I cannot conceive, nor do I believe the ſuppreſſion of this diſcharge can any ways obſtruct the cure.

NOTHING then but a too great want of ſubſtance in the lip ſhould prevent us from performing the operation; for if the parts which we would have united, can be but juſt brought to touch, we may always hope to ſucceed. I have often been obliged to cut off the whole lip, and yet, by ſeveral ſtitches, ſupported by the dry ſuture, have always procured a re-union.

THE hare lip may be born with us, and in that caſe the ſides of the fiſſure do not bleed, which circumſtance is an obſtacle to the union. The ſame inconvenience attends an accidental hare

lip

lip after it has continued ſome time; for the ſides of the wound being almoſt cicatrized leave no paſſage for the nutritive juice, and conſequently no re-union can be expected. But ſurgery affords a help for this by making a freſh wound, as will be more particularly mentioned hereafter. Laſtly, the accidental hare lip may be only of two or three days ſtanding, but the ſides of the wound are become inflamed, ſwelled, and hard.

We will ſuppoſe this deformity in the upper lip, and either to have been born with us, or elſe accidental and of ſo long ſtanding that the ſides of the wound are almoſt cicatrized. Our buſineſs in this caſe is to make them bleed, as if the deformity had been accidental and recent; and in order to this, having properly prepared the patient, I place him upon a chair in a good light, with his head declining a little, and held firm by an aſſiſtant. If the diviſion is in the middle of the lip, I firſt ſeparate the *frænulum* that connects the lip to the gum, as that might otherwiſe incommode us in the operation; but, if the diviſion be in any other part, the ſeparation of the *frænulum* will be unneceſſary. After this, I take the ſides of the fiſſure one after another, and holding them with the thumb and forefinger, or with a pair of *forceps* which I deliver into the hand of an aſſiſtant, I cut through the ſubſtance of the lip in ſuch a manner that the two inciſions form an angle. Some ſurgeons make theſe inciſions with ſciſſars, others with a biſtory. If I make choice of the latter, I penetrate the lip with the point of a half-curved biſtory above the angle of the fiſſure, and paſſing the edge along the *forceps*, I finiſh the inciſion at the edge of the lip. I then hold the other ſide in the ſame manner, and make the like inciſion there,

and as the re-union is not to be attempted till the wounds have done bleeding, I touch them with some slight styptic, agreeable to the direction given in treating of sutures in general.

According to the size of the lip and of the division, I make one or more stitches, and each stitch a quarter of an inch distant from the other. The first must be made in the red part of the lip, in order to render both sides even, and to prevent any remaining appearance of a fissure. The upper stitch, or that nearest the nose, must be placed very near the angle of the division, lest any fistulous hole should remain there. If steel needles are used upon this occasion they are very apt to rust and sometimes cause an *erysipelas* in the part, at least a suppuration in the orifices which they make in passing; for this reason I always make use of gold pins, which are not liable to rust, and their heads are very convenient to hold them by, whereas the needles require the help of an instrument to push them through. The manner of passing the pins is as follows. I place the left forefinger and thumb on the right side of the lip, and exactly at the edge to bear it up, and taking the head of the pin between the other forefinger and thumb, I enter its point into the left portion of the lip and pass it out at the right, between the finger and thumb that bear it up. This pin penetrating thus at once through both parts of the lip, the suture will include almost their whole substance. In the same manner I put in as many pins as are necessary, observing that the last be placed near the angle of the wound. When they are all introduced, I take a pretty large waxed thread and twist it once or twice only about the first pin, that is, I pass it alternatively under the

the head and under the point; then paſs on the ſame thread to the ſecond pin, and ſo on to the third, in ſuch a manner that the threads croſs each other upon the lip itſelf between the different ſtitches: by this means the edges of the fiſſure cannot either recede or riſe up.

SOME authors propoſe to put a ſmall compreſs between the lip and the gum to prevent their adhering; but this is quite unneceſſary, and may prove prejudicial: firſt, becauſe being wetted with the *ſaliva* it might probably convey the moiſture between the parts which we mean to unite: and ſecondly, as it may keep the lip at a diſtance from the gum, and thereby ſtrain the ſtitches. After the ſuture is finiſhed, I fix a little ball of wax on the point of each pin to prevent its pricking; and this method ſeems preferable to the ſmall compreſſes which are recommended by ſome authors for this purpoſe, as theſe laſt might be ſubject to ſtrain the parts by raiſing the pins from the ſkin.

I COVER the fiſſure with a ſmall linen rag dipped in ſome glutinous balſam, as *balſ. tereb. capivi*, &c. and ſtrengthen the ſtitches with ſlips of ſticking plaſter, one end of which ſhould be ſtuck upon one cheek under the *os jugale*, and the other end upon the other cheek, paſſing above and between the pins. At the ſame time that theſe ſlips of plaſter ſerve to ſtrengthen the ſuture, they keep on the linen rag that covers it. It is propoſed likewiſe to lay over the whole a compreſs of a ſufficient length, and of a breadth proportionable to that of the lip; likewiſe to keep it on with a double-headed roller of the ſame breadth, and applied in ſuch a manner, that it may contribute alſo to

ſtrengthen the ſtitches by bringing the ſkin of the cheeks forward; but we find by experience that this bandage is generally diſplaced when the patient is in bed, and may diſorder the ſituation of the other dreſſing. If the ſuture therefore is well made, it is better not to apply the bandage.

Some practitioners diſliking the twiſted ſuture, pretend that the interrupted one is ſufficient, and equally beneficial in this caſe: but the twiſted ſuture has many advantages which the interrupted has not. The pins or needles uſed in the former, are not ſo likely to cut through the ſkin as the thread which is uſed in the latter. Beſides, the thread, which, in the twiſted ſuture, is turned round the pins, and is in ſeveral places croſſed upon the fiſſure, preſerves the edges of the fiſſure even; whereas in the interrupted ſuture, as there is nothing to keep the edges level, they would be apt to turn up. Theſe, I think, are ſufficient reaſons for preferring the twiſted ſuture.

As keeping the parts free from motion is neceſſary to promote the cure, the patient ſhould obſerve a ſtrict ſilence; and live upon ſpoon-meats, which he ſhould take with a boat. He ſhould likewiſe avoid ſpitting, contenting himſelf with wiping off the *ſaliva* from his lips. There is one caution more which, perhaps, may ſeem unneceſſary, and that is, whoever attends the patient ſhould avoid any occaſion of making him laugh. This, I ſay, may, perhaps, ſeem an unneceſſary caution; but I once ſaw an inſtance where, by the patient's laughing at ſomething that was mentioned before him, he broke out one of the ſtitches. When it is neceſſary to perform this operation upon a child at the breaſt, it muſt be fed with warm milk by a boat; for it could not ſuck

without moving the lips, which would be prejudicial, or the pain hindering it from fucking, the child muft be always crying.

If the operation is well performed, the pins may be removed in two days: I have taken them out of children at the end of four and twenty hours, and found the re-union completed; and by leaving them in too long we run the hazard of bringing on an *eryfipelas* upon the lip, which may fpread afterwards over the face.

Whilst the pins are taking out, an affiftant muft prefs the cheeks forward, as in the operation, and when they had removed, the thread fall off.

The dry future fhould be continued for fome days longer, and the patient obferve the fame cautions as if the pins were ftill in; for though the cicatrix is formed, it remains tender fome time, and the lip, if left to a free motion, may probably divide again. It has been propofed to put a fteel inftrument upon children, made in a femicircular form, and the ends of it to prefs againft the cheeks in order to fupport the parts when they cry; but this appears at firft fight to be unneceffary, as the dry future is fufficient to counteract fo weak a force. Befides, it feems more likely to do harm than good, for, in proportion as it preffes againft the cheeks, it would be more or lefs uneafy, and making the child crofs, would keep it conftantly crying.

It remains now to fpeak of the accidental hare lip, which has continued about three or four days, when the divided edges are become fwelled, hard, and inflamed. The twifted future is here improper, according to the rules before laid down; but the following Cafe will ferve to direct what method to purfue.

In

In 1739, I was ſent for to ſuch an accident. The wound was in the upper lip, and made obliquely, extending from the middle of the lip to one ſide of the noſe. As the twiſted ſuture was here impracticable, I had recourſe to the dry ſuture, by which I kept the divided parts exactly together. A ſufficient ſuppuration enſued to bring down the ſwelling at the edges of the wound, and frequently the ſlips of plaſter were ſo moiſtened by the diſcharge as made it neceſſary to apply others. The patient obſerved a perfect ſilence, and lived upon ſpoon meats taken with a boat; and in a fortnight the wound was perfectly united, without leaving the leaſt blemiſh.

Of the POLYPUS.

THE inſide of the noſtrils is lined with the *membrana pituitaria*, ſo called becauſe the glands therein diſtributed ſecrete a mucilaginous lymph from the blood, to which the antients have aſſigned the name of *pituita*. This membrane, almoſt in its whole extent, is of a thick and ſpongy texture. It is connected to the bones by a cellular ſubſtance, which, when inflated with a blow-pipe, puffs up; and it is this membrane with its cellular ſubſtance that forms the various kinds of polypuſes.

WHAT we call a *polypus* is an excreſcence that ſometimes ariſes in the noſe, and is generally covered with a kind of *epidermis*. We likewiſe find excreſcences of much the ſame appearance ſituated in

in the ears, *pudenda*, and *uterus*; and which ſeem to have an equal title to the ſame name.

The different kinds of Polypuſes.

POLYPUSES vary from each other according to the different cauſes that produced them, and the alterations that happen in them.

SOMETIMES a *polypus* is owing to a ſwelling of the pituitary membrane, which ſwelling may poſſeſs a greater or leſs ſpace of the membrane, as alſo its cellular ſubſtance, and may affect either one or both noſtrils. At other times it ariſes from an ulcer produced by a *caries* of ſome of the bones which form the internal ſurface of the noſtrils.

POLYPUSES are ſometimes ſo ſoft, that upon the leaſt touch they are lacerated and bleed; at other times they are very compact and even ſchirrous.

SOME continue ſmall a great while, others increaſe ſo faſt as in a ſhort time to puſh out at the noſtril, or extend backwards towards the throat. I have known them fill up the ſpace behind the *uvula*, and turning towards the mouth, have protruded the fleſhy arch of the palate ſo far forwards as to make it parallel with the third of the *dentes molares*.

THERE are others, which, though at firſt free from any malignant diſpoſition, become afterwards carcinomatous and even cancerous.

OF whatever nature the *polypus* be, it intercepts the paſſage of the air through the noſtril, and when large, forces the *ſeptum narium* into the other noſtril, ſo that the patient is unable to breathe unleſs through the mouth. A large *polypus* preſſing in like manner upon the *laminæ ſpongioſæ*, or the *oſſa turbinata*, gradually forces them down upon the *oſſa maxillaria*, and

 thereby

thereby compresses and stops up the orifice of the *ductus lacrymalis*: nor is it impossible for the sides of the *canalis nasalis* to be pressed together. In which case the tears having no passage through the nose, the eye is kept constantly watering, and the *sacculus lacrymalis*, not being able to discharge its contents, is sometimes so much dilated as to form what is called a flat *fistula*. I have seen instances of polypuses so much enlarged as to force down the *ossa palati*.

CAUSES. A *polypus* may proceed from two causes. First, from a disease of some of the bones that form the internal surface of the nose, which are either wholly or in part exostised or carious. In this case the pituitary membrane also, becoming distempered, swells and ulcerates, and the disease spreading, a sort of fungous excrescences shoot up from these parts, to which they give the name of polypuses. The *caries* and the ulcers may proceed either from a venereal, scorbutic, or scrophulous cause. Secondly, a *polypus* may arise from an inflammatory swelling of the pituitary membrane and an obstruction of its glands, and this swelling may be more or less extensive and considerable.

SIGNS. By the symptoms which I have already enumerated in speaking of the various kinds of polypuses, we may easily discover them, and likewise judge of their size and consistence; and in a great measure of their different dispositions. We may know by the touch whether the *polypus* is soft, or of a compact substance; its being indolent or attended with pain, will enable us to decide whether it is of a mild or of a cancerous nature; and in short, other circumstances, which we may learn by enquiring what disorders the pa-

tien.

tient either is, or has been ſubject to, will diſcover whether it is venereal, ſcorbutic, or ſcrophulous. But there is one particular which it is very difficult and ſometimes impoſſible to be certain of, and that is, from what part of the noſe the *polypus* derives its root. It muſt either be from the *ſeptum*, from one of the *oſſa turbinata*, from the arch of the palate, or elſe from the *apophyſes pterigoidei*. The only means of acquiring a perfect knowledge of this circumſtance, is by paſſing a blunt probe along the body of the *polypus* and examining round it.

PROGNOSTIC. The prognoſtic in this caſe is to be collected from the following conſiderations, viz. the cauſe that produced the *polypus*, the degree of its increaſe, and the diſorders which it may have occaſioned in the adjacent parts, by its ſize.

WHEN the *polypus* proceeds from a venereal cauſe, we may expect to remove it by curing the original diſeaſe. In this caſe, where there is a *caries* in ſome of the bones which form the noſtrils, the ulcer of the pituitary membrane cannot be healed till after the exfoliation of the bone, and the bone will not exfoliate till the venereal *virus* is deſtroyed. In all probability therefore this may prove a work of time, ſince, from the ſituation of the carious bone, no proper remedy can be applied to haſten the exfoliation; but the affair muſt be left entirely to nature, who is ſometimes upon theſe occaſions very tedious in her operations.

THE ſame thing will happen if the *caries* ariſes from any other cauſe. Nay, even if there be no *caries*, we ought to be very cautious in giving our prognoſtic, becauſe of the great difficulty, as

well in discovering to what particular part the *polypus* adheres, as in applying the proper remedies to it. Besides, though we may often promise a cure, we cannot secure the patient from a return of the disorder. I have extracted several, and others have appeared in the same nostril above six years afterwards, though the former seemed to have been intirely eradicated.

CURE. The cure of a *polypus* has sometimes been undertaken by applying liquid caustics to the tumor upon the end of a hair pencil or feather, but I never knew this method succeed; and the reason is this: The caustic is slow in its operation, and the *polypus* rises again as fast as it is consumed. Besides, if we could destroy what was within our view, we cannot eat away the root; and therefore I shall propose no other method than the operation, which must be undertaken in different ways, according as different circumstances occur; for all polypuses are not to be removed by the same means.

IN treating of the several kinds of polypuses, I observed that some of them were of so soft a texture they were easily lacerated: these are very difficult to be extracted, unless their root is very narrow, of which it is impossible to be certain. Notwithstanding this, we are to endeavour at it; and, in order to succeed in our attempt, we are first to try whether we can discover on which side the root is situated; that is, whether the *polypus* adheres to one of the *ossa turbinata*, or to the *septum narium*; for as we are to take hold of it with the *forceps* as near the root as possible, it will be necessary to turn them differently.

THE

THE patient being properly prepared, I feat him on a chair, with his head fupported and held firm by an affiftant; I then introduce a pair of perforated *forceps* into the nofe, and get the *polypus* between the claws, which I advance as high as I can; at the fame time directing the patient to force his breath out at his nofe as much as poffible, in order that the air, which cannot pafs through the noftril affected, may drive the *polypus* forwards into the *forceps*. I then clofe the *forceps*, and turning them gently round, as often as I judge neceffary, I twift the *polypus* by little and little. Thus every turn we give to that portion of the *polypus* contained within the *forceps*, is continued on to the root, and gradually loofens it.

IF the *polypus* breaks, as fometimes happens either from its foftnefs, or from the impoffibility of taking fufficient hold of it, it muft be extracted by pieces, or as much of it as you can. This done, we fhould pafs a feton up the nofe, one end of which hanging out at the mouth, the other at the noftril, may ferve to convey doffils armed with proper medicines to deftroy the remainder of the *polypus*.

THERE is an account of fuch a cafe, in my *Obfervations*, page 25, and the effect of this method of treating it. It was upon that occafion I firft thought of paffing a feton up the nofe, which had never been practifed before.

WE may pafs this feton either with a pair of femicurved *forceps*, or by the help of a cat-gut. If the *forceps* can be introduced along the *vomer*, I tye a feton round the end of my forefinger, and paffing it into the mouth behind the *uvula*, I endeavour to meet it with the *forceps* which I pafs up the

the nose. When the *forceps* touches the finger, I open the claws a little and lay hold of the seton, then withdrawing the *forceps* I bring the seton out at the nose. If the *forceps* cannot be passed, I introduce a fine cat-gut; one that is very dry, blunt at the end, and about a foot long. This will pass very easily behind the palate, so that conveying in the forefinger through the mouth behind the *uvula*, I take hold of the cat-gut, bend it, and bring it out at the mouth; at the same time pushing it up through the nose with the other hand. Thus we draw out the whole cat-gut at the mouth, and with it one end of the seton that is fastened to its extremity. Care must be taken when you introduce the finger behind the *uvula*, not to press upon the root of the tongue, which would be apt to excite a reaching that might prevent our passing the seton.

The greatest part of the *polypus* being extracted, we may with more ease pass up a finger into the nostril; and sometimes we thereby discover the exact situation of the adherence. In which case, we fasten a small dossil to the seton, dipt in some styptic water, and drawing the seton out at the mouth, we convey the dossil either to the remainder of the *polypus*, or to the part whence we imagine it derives its root.

The slough made by the styptic not only stops the blood, but partly destroys what remained of the *polypus*; and, by means of a dossil of this kind, we may every day convey to the part either escharotic, suppurative, or deficcative medicines, according as we judge necessary.

If the *polypus* comes away entirely in one single piece, an hæmorrhage ensues, which is sometimes very troublesome to the patient by obliging him

to

to be ſpitting out the blood as faſt as it falls down into his throat. If the bleeding is not very conſiderable, the patient ſhould be directed to ſtoop forwards, that the blood may flow out at the noſtrils; by which means, and by injecting cold water into the noſe, the hæmorrhage will ſtop. But if the hæmorrhage is very violent, it requires the utmoſt care, there having been inſtances of people who, from the impoſſibility of ſtopping it, have died in leſs than an hour. In this caſe, the ſeton is a very uſeful and a very ſure method, and ſhould be paſſed as ſoon as poſſible. When we have introduced the ſeton, we muſt faſten a doſſil to that end of it which hangs out at the mouth, and drawing it along the noſe, convey the doſſil through the mouth, ſo as to place it between the *vomer* and the *apophyſis pterigoides*: by this means the paſſage is ſtopped, and the blood prevented from running down the throat. Another doſſil put up the fore part of the noſtril ſtops the bleeding there in the ſame manner; and thus the blood, being denied a paſſage either way, coagulates in the noſe, and by degrees ceaſes to flow at all, the coagulation extending into the orifice of the veſſel from whence it iſſued.

SOMETIMES thoſe polypuſes which are of a more compact ſubſtance, may be extracted in the ſame manner; but oftentimes they are ſo large as to hinder us from paſſing the *forceps* high enough to take proper hold of them. Add to this, that their irregular figure, which is formed according to the cavity of the noſtrils, and likewiſe their hardneſs, will not admit of our twiſting them like thoſe of a ſofter texture. There are ſome, which, in proportion to their bulk, have thrown ſtrong roots into the pituitary membrane, and thereby rendered

this membrane very thick. In which caſe there is great reaſon to apprehend a very troubleſome hæmorrhage will attend the operation. There is an account of ſuch a *polypus* in my *Obſervations* (ſee page 25), which extended out two fingers breadth from the noſe, and likewiſe ſpreading behind the *uvula*, grew there as large as an apple; ſo that I was not able to extirpate it at once, but was obliged to cut it away at different times. A proper conſideration of this caſe may furniſh ſuch hints for deſtroying this ſort of *polypus* as may be adapted to the different circumſtances that occur; for I cannot pretend to be particular in the manner of operating, as the figure of theſe polypuſes may happen to be very different.

There is another kind of *polypus*, which is not proper to be extirpated, and that is, when the greateſt part of the pituitary membrane, either on one or both ſides of the noſe, is enlarged by a ſort of polypous ſwelling. I have never ſeen but two inſtances of this, in one of which the tumor was only on one ſide of the noſe, where the bulk of the pituitary membrane (which for many years was thickened a quarter of an inch in the anterior part, and perhaps more ſo poſteriorly) had thruſt the *ſeptum narium* into the other noſtril, and intercepted the paſſage of the air on both ſides. In the other perſon, the ſwelling was on both ſides, but much larger in one noſtril than in the other. In ſuch caſes, no operation can be undertaken; but if we can diſcover, or have reaſon to ſuſpect from any concomitant ſymptom, that the aliment is originally owing to the venereal or any other diſeaſe, we muſt apply our endeavours to cure that before we attempt doing any thing to the noſe; and it is probable that the diſorder of the pituitary

membrane may be removed by the uſe of theſe remedies. If, as was the caſe in the two patients before-mentioned, we have cauſe to believe that the diſorder is merely local, we muſt have recourſe to the general remedies, as diluters, bleeding, and ſuch evacuations as will make a revulſion, and carry off the humours which lodge in the part affected; and afterwards endeavour to open an eaſier paſſage for the air through the noſe.

We may ſucceed herein by deſiccative injections, which muſt be frequently repeated, and, if poſſible, forced into the throat; but care muſt be taken, that the liquor which they are made of may not be capable of doing any harm, if it ſhould be accidentally ſwallowed.

To the firſt of theſe two patients, after the uſe of injections, which had but very little abated the diſeaſe, I tried another method, which palliated, but did not cure. I paſſed in a ſmall cat-gut at the noſe, along the arch of the palate, almoſt as far as the *uvula*. The cat-gut ſwelling made the paſſage ſomewhat freer, and having introduced others of the ſame kind for ſome time, I then put in a larger; and by proceeding thus ſeveral days ſucceſſively, I could at laſt introduce three or four pretty large ones together, equal in the whole to the ſize of a writing-quill. They ſoon grew ſoft by the moiſture which ſwelled them, and gave but little trouble to the patients by their hardneſs. Theſe cat-guts, together with the injections, kept the paſſage open ſo as to let the air paſs freely through when they were taken out; but if the uſe of them was omitted two or three days, the paſſage cloſed up again. Having purſued this method about a month, I found we could only obtain a palliative cure, even by con-

tinuing the tents of cat-gut. The patients therefore only put them in at night upon going to bed, and took them out in the morning, by which means he breathed freely all day. He then returned into his own country: and as to the other patient, I faw no more of him after two or three vifits.

As a perfect cure in thefe cafes is very difficult to be obtained, I thought it proper to communicate to the public this method, which I had recourfe to for the eafe of the patient, and to render his diforder more fupportable.

OF THE

FISTULA LACRYMALIS.

THE *fiftula lacrymalis* is a deep, hollow ulcer, fituated in the great angle of the eye, and generally proceeds from an abfcefs formed there.

But, in order to give a juft idea of this diforder, it may be proper to defcribe the natural ftructure of the part.

At the edge of the eye-lids, near the great angle of the eye, are placed two orifices, called *puncta lacrymalia*, which are the entrances of two fhort ducts that afterwards unite and form a fingle canal opening into the *facculus lacrymalis*. It is by thefe *puncta* that the tears, which moiften the anterior part of the eye, pafs into the *facculus lacrymalis*.

The *facculus lacrymalis* is a fort of bladder, of an oblong figure, very fmall, and compofed of a pretty ftrong membrane. This cavity, or fac, is fituated in the great angle of the eye within the orbit, in a fort of groove formed by the *os maxillare superius* and the *os unguis*. As

As it grows narrower it extends itſelf into the bony lacrymal canal, which is likewiſe formed by the ſame bones, and opens into the noſe under the *os turbinatum inferius*, in order to carry along the tears that paſs thither through the *puncta lacrymalia*. This contracted part of the ſac we ſhall call the lacrymal canal.

THE lacrymal *ſac* is liable to many different diſorders, which may degenerate into a *fiſtula*. Sometimes this *fiſtula* may be owing to an inflammation of the *membrana adipoſa*, and the adjacent cellular ſubſtance which communicates itſelf to the neighbouring parts; or it may be owing to a dilatation of the ſac by the tears lodging there, either becauſe they cannot paſs through the noſe, or return without difficulty through the *puncta lacrymalia*.

Of the diſorders that may communicate themſelves to the ſac.

AN inflammation ſometimes ſeizes on the lower eye-lid, near the great angle, which, as long as it continues, occaſions the tears to run down the cheek, the ſwelling of the eye-lid preventing their paſſage through the *puncta*, at leaſt the inferior one.

THIS inflammation requires the ſame method of treatment as other inflammations, viz. a proper regimen, bleeding, emollient and reſolvent cataplaſms, and, in a word, whatever can conduce to abate the inflammation, and promote its reſolution. But as we are not always happy enough to anſwer theſe intentions, an abſceſs ſometimes enſues; which may prove only ſimple, and be eaſily removed by making an opening into it, and applying proper dreſſings; or the inflammation may extend

to the lacrymal ſac; in which caſe, the whole portion of the ſac forming the *canalis lacrymalis* may be alſo affected.

THIS is another reaſon why the tears muſt neceſſarily run down the cheek, ſince even the tears which are in the ſac have no paſſage into the noſe, and their lodgement only contributes to render the diſeaſe more troubleſome. It is poſſible, however, that the ſurface only of the *ſacculus* may ſuppurate, and the diſorder then is eaſily remedied, as in the former caſe.

BUT it may happen, that the whole ſubſtance of the *ſacculus* is affected ſo as not to admit a perfect reſolution, in which caſe a ſuppuration comes on, and the matter makes its way through the ſkin. Upon opening theſe abſceſſes, we do not find the *pus* white and thick, as in the preceding caſe, but ſerous and thin, from its being mixed with the tears.

IT is very ſeldom this diſeaſe is perfectly cured, though the opening be made ever ſo properly, or the dreſſings ever ſo judiciouſly applied; and the reaſon is this: the opening made into the *ſacculus* will almoſt neceſſarily produce a *fiſtula*, for unleſs nature cloſes this opening by a firm and ſolid cicatrix, the tears which continually flow there through the *puncta lacrymalia*, will render it callous, and thereby hinder its healing. Thus ſome of the tears will paſs out through the external aperture, whilſt the reſt are continued on through the *canalis lacrymalis*, ſuppoſing that paſſage to have become free by the ſuppuration, which generally unloads the parts that were diſtended by the inflammation. Neverthelefs, I have ſometimes known theſe diſorders perfectly cured without any other operation than making an opening into the

the abſceſs; and admitting a *fiſtula* ſhould remain, it will be always time enough to undertake the cure of it by the operation hereafter deſcribed.

The *ſacculus* having been affected by the inflammation, ſometimes putrefies intirely, and ſloughs away. In which caſe, the *ſacculus* can never be reſtored, nor the tears paſs any more through the noſe. Here then a ſimple opening will not be ſufficient, but recourſe muſt be had to the operation; as the diſeaſe is then in the ſame ſtate as that which begins in the *ſacculus*.

Of a fiſtula *which begins from a diſeaſe of the* ſacculus.

The *ſacculus lacrymalis*, which is a membranous bag, is ſubject to inflammations, like other membranes.

The cauſe of this inflammation is as difficult to be accounted for, as that of other inflammations, in general; I ſhall not endeavour therefore to explain it, but ſhall only obſerve, that if the whole ſac is inflamed, it may break in one particular point, producing ſuch a kind of *fiſtula* as was before deſcribed; and that it may likewiſe entirely putrefy and come away. In this laſt caſe, the *perioſteum*, which lines the groove wherein the *ſacculus* is ſituated, alſo putrefies, and upon opening theſe abſceſſes we find the *os unguis* uncovered and rotten; and ſometimes the *caries* extends farther.

These *fiſtulæ* frequently appear after the ſmall-pox, in which caſe they muſt certainly have begun by the putrefaction of the *ſacculus*, in or upon which ſome of the puſtules (which are only ſo many abſceſſes) were ſituated. The diſorder of

the *facculus* may fpread to the cellular fubftance that covers it, forming one fingle abfcefs, which if not timely opened, but fuffered to break of itfelf, the lodgement of the *pus* upon the bones, whofe *periofteum* putrefied togrther with the *facculus*, renders them carious, and encreafes the difeafe. The only means of curing this fort of *fiftula* is by an operation; which does not confift merely in opening the whole extent of the abfcefs, for as the *facculus* is putrefied, the difeafe has certainly reached to the lacrymal canal, and the natural communication between the eye and the nofe, for the paffage of the tears, is thereby deftroyed. The method therefore of curing this diforder muft be by making a new paffage in order to fupply the lofs of the natural one, and open a way for the tears to pafs through the nofe.

Cure. The patient having been properly prepared, and every thing got ready for the operation, I feat him on a chair, whilft an affiftant holds his head to prevent his moving it.

I will firft fuppofe the abfcefs is not yet opened, in which cafe we make an incifion into the whole extent of it, and fill up the cavity with lint, to keep the lips of the ulcer divided till the next day: at which time, upon removing the lint, we may be better able to judge of the ftate of the parts affected; whether the *facculus lacrymalis* is deftroyed or not, and whether the *os unguis* is denuded.

Suppose, in the next place, that the abfcefs has broke of itfelf fome time, and has produced a *fiftula*; the adjacent parts approaching each other fill up and render it callous, though feldom to fuch a degree as to prevent us from introducing a probe into the fiftulous opening, by which we may difcover the progrefs of the difeafe. If we find

find the bone bare, it is certainly carious, and the lacrymal fac is putrefied and deftroyed. In this cafe, an incifion is equally proper, and muft be made fo as to include the fiftulous orifice. We fhould begin the incifion very near the union of the eye-lids, where paffing in the point of a ftrait biftory, and guiding it along the inferior edge of the orbit internally, we make a femicircular incifion near three quarters of an inch long. We might then proceed to finifh the operation in the manner as will be hereafter directed; but it is better, after we have gone thus far, to fill up the wound, either with fmall doffils, or prepared fpunge, in order to feparate the lips till the next day, when it will be eafier to execute what fhall then be found neceffary.

Practitioners are divided about the manner of finifhing this operation, which is defigned to facilitate the paffage of the tears into the nofe. Some infift that the *os unguis* fhould always be perforated; others will allow of no other paffage for the tears than the natural one, through the lacrymal canal; but the different circumftances attending the difeafe muft determine us which method to purfue.

If the lacrymal fac is only opened, and not deftroyed, its expanfion, which extends through the bony lacrymal canal into the nofe, remains intire, and the fwelling that enfued from its being inflamed will foon difperfe after the evacuation of the *pus*. Here then we are to conform to the intentions of nature, which originally formed this paffage, and has preferved it; but if the *os unguis* is carious, or intirely bare, the lacrymal fac is deftroyed; and how fhould that portion of it, which extends to the nofe, remain found, intire, and open? In this cafe, therefore, we cannot dif-

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penſe with perforating the *os unguis*, in order to make a new paſſage for the tears.

Upon removing the lint from the wound the day after the operation, we eaſily diſcern the ſtate it is in. If we find that the *ſacculus lacrymalis* is not deſtroyed, we may hope to preſerve the natural paſſage of the tears; and if we can introduce a fine probe, or a very ſmall *bougie*, we may diſcover whether the entrance of the *canalis lacrymalis* is open: but, before we attempt this, we muſt wait till the wound ſuppurates, that the ſwelling of the canal may be gone off, at which time ſlight deſiccative injections may be uſed. It has been propoſed to introduce a very ſmall *bougie*, as we do in the *urethra*, in order to enlarge the canal; but I cannot approve of this method for ſeveral reaſons. Firſt, becauſe that part of the lacrymal ſac which lines the bony lacrymal canal, is of a very fine texture, and may be eaſily lacerated. Secondly, the introduction of this *bougie*, and its continuance there, occaſions great pain; and, Thirdly, this canal has no need of being enlarged, and if it had, it could not poſſibly be dilated, as it is encloſed within a bony groove. It will be ſufficient therefore to make injections therein for ſome days, taking great care not to irritate the entrance of the duct with the end of the ſyringe.

If, upon examining the bottom of the wound, we find the lacrymal ſac deſtroyed, and the *os unguis* bare and carious, the bone muſt be perforated to make a new paſſage.

The antients did this with an actual cautery, which they applied to the *os unguis* by introducing it through a *canula*, in order to prevent any injury to the other parts by the heat. This method is not abſolutely to be rejected, but actual fire is

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apt to terrify patients, and the pain of it extending to the pituitary membrane that lines the inſide of the noſe, muſt be very great; for which reaſons this method is now grown out of practice. Some ſurgeons rather approve of breaking thro' the *os unguis* with a ſtrong probe; but, though this method is leſs painful than the actual cautery, it is liable to one great inconvenience, viz. the pituitary membrane is not eaſily penetrated at the ſame time with the *os unguis*, but, on the contrary may be ſeparated even farther than the *os unguis* extends: I ſhould rather chuſe therefore to make uſe of a trocar, which will paſs through the bone and the pituitary membrane at once.

In order to do this, I remove the lint from the wound, and paſs down a director, in the groove of which I convey the point of a large trocar, and perforate the bone by turning about the trocar ſo as to break the bone into pieces. The trocar muſt be directed towards the *uvula*, by which means we ſhall avoid hurting the *ſeptum narium*. Nevertheleſs, we are to thruſt it no farther than juſt to pierce the bone and the membrane that lines the inſide of it; and we are ſure with this inſtrument not to ſeparate the pituitary membrane from the bone, which is an accident that may happen by breaking the bone with a probe. We may know when the trocar is got through, by a ſmall diſcharge of blood from the noſe. Having thus deſtroyed the bone, we introduce into the aperture a tent made like the *bougies* of linen, dipt in wax, and rolled. This tent ſhould be an inch or more in length, and of the ſame bigneſs with the upper part of the trocar, running taper to the other end, which

which ſhould be blunt. The head or upper extremity of this tent ſhould be provided with two wings, which fix it in the opening made in the bone, and at the ſame time keep the lips of the wound ſeparate. In putting it in, it ſlips down and lodges itſelf between the internal ſurface of the noſe and the *ſeptum*.

THE reſt of the wound is to be filled up with lint armed with a digeſtive, and the whole kept on with ſmall triangular compreſſes and a proper bandage.

WE ſhould change the tent at each dreſſing, as the intention to be anſwered by this operation is not only to make a paſſage for the tears, but alſo to keep it from cloſing again.

AFTER perforating the *os unguis*, ſeveral ſmall pieces of bone may remain fixed in the pituitary membrane within the noſe. Theſe will generally come away by the ſuppuration of the little membranous portions in which they are intangled; but ſometimes they lodge a conſiderable time, and require our aſſiſtance to haſten their diſcharge. The method to be uſed in this caſe is, when the ſuppuration leſſens, to introduce a cauſtic into the orifice made in the *os unguis*. The *lapis infernalis* is commonly choſen for this purpoſe, but, in paſſing of it, is ſometimes liable to break, as once happened to me, and occaſioned a great deal of trouble and difficulty to get out the piece that had lodged itſelf in the opening of the *os unguis*: and had it fallen into the noſe or throat, it might have diſſolved there and done great miſchief. Since this accident, I have always preferred a tent dipt in mercurial water, and paſſed into the aperture of the *os unguis*, without thruſting it far enough to touch the *ſeptum narium*. I leave it in but for a mo-

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ment, which is long enough to produce a slough, that falls off in a few days, and brings with it the bony fragments that adhered: the application of the caustic to the part of the bone that is bare and carious, contributes also to hasten its exfoliation, which is made imperceptibly.

We continue the use of the tent a month or six weeks, till the part of the ulcer that is situated near the orifice of the *os unguis* be deterged, and rendered so firm as not to produce any fungous flesh which might stop it up. When this is done, we endeavour to heal the external opening.

The tears fall then into the nose as fast as they pass through the *puncta lacrymalia*, and their passage serves to keep open the hole in the *os unguis*. The tears in their natural course fell into the nose below the inferior *os turbinatum*; but, in this case, they pass into it above the superior *os turbinatum*. Undoubtedly this new passage, which is the only way that can be made to supply the want of the natural one, is not so perfect as the other, since after the cure there often remains a slight weeping.

Of the flat fistula.

The *sacculus lacrymalis* is susceptible of dilatation, like other bladders which are constantly filling, and which are apt to lose their elasticity, when the fluid they receive passes out of them with difficulty. The urinary bladder gradually loses its elastic power by being distended when the passage of the *urethra* is obstructed. The gall-bladder dilates and yields to the quantity of bile which is confined in it by an obstruction of the *ductus cysticus*; and accordingly, upon opening these bodies after death, we find the gall-bladder very large.

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The lacrymal ſac is of the ſame nature. If by any means the tears that run into it are denied a paſſage into the noſe, the tears themſelves diſtend it, and it gives way to the quantity of that fluid, ſo as to extend ſometimes into the inferior part of the orbit. A ſwelling of the pituitary membrane is alone ſufficient to prevent the paſſage of the tears, by choaking up and obſtructing the opening of the *ſacculus* into the noſe beneath the inferior *os turbinatum*. This we frequently ſee happen in thoſe defluxions which we call a cold in the head. A ſlight ſwelling of the membranes that form the *ſac* will alſo have the ſame effect.

SIGNS. It is difficult to diſcover this diſorder at the very beginning, but the leaſt lodgement of the tears in the lacrymal ſac will produce ſuch an alteration in them as to make them irritate the internal membrane; and the ſlight pain which the patient afterwards feels in that part, together with the tears running down the cheek, are ſufficient indications of the diſeaſe. We find in this caſe, that, upon preſſing the ſac with the finger, the tears which filled it will return through the *puncta lacrymalia*. It is very ſeldom theſe tears are clear, for the inſide of the ſac is eaſily inflamed, which renders them of a purulent nature and rather white.

PROGNOSTIC. At the beginning of this diſorder we may hope to ſucceed in the cure; but when the ſac is very much dilated, it irrecoverably loſes its elaſticity, and the tears conſtantly lodging there may injure it ſo in time as to make the ſac putrefy and ſlough away, which will produce a *fiſtula* with a *caries* of the bone.

CURE. This diſorder at the beginning requires a treatment very different from what is expedient

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in its progreſs. At the beginning we muſt endeavour to remove the ſwelling of the lacrymal ſac, or the pituitary membrane, in which we may ſucceed by a proper regimen, bleeding, and emollient applications in the forms of *collyria*, fomentations, and cataplaſms. During the uſe of this method, we muſt empty the ſac ſeveral times a day by preſſing it with the finger, which makes the tears return through the *puncta lacrymalia*, and ſometimes part of them paſs through the noſe.

If the internal ſurface of the ſac begins to be affected, which may be known by the whitiſh colour of the tears that are preſſed through the *puncta lacrymalia*, they muſt be forced up ſeveral times a day, and two or three drops of a *collyrium*, made with white vitiol, or *saccharum ſaturni*, ſhould be dropt into the eye. It has been propoſed to make injections through the *puncta lacrymalia*; but if the *puncta* are open, the water dropt into the eye will paſs into the ſac, and the uſe of the ſyringe ſhould be omitted, as by uſing it we may inflame the *puncta lacrymalia*, and the little ducts that lead into the ſac. With theſe precautions, I have ſeen many of theſe fiſtulas cured that have not been of long ſtanding, and where the lacrymal ſac was not much dilated. But when the lacrymal ſac is diſtended to three or four times its natural ſize, there is no probability of effecting a cure by ſo ſimple a method, and the only means we have left is an operation. The lacrymal ſac indeed may be often preſſed, to force out the tears that diſtend it; but this preſſure will not empty it intirely, and perhaps may injure the ſac itſelf by gradually irritating it, and thereby produce an abſceſs that may quite deſtroy it. It is better therefore to perform the operation before the lacrymal ſac is affected and

and putrefies. In this caſe, the inciſion to be made in the ſoft parts is the ſame as was before deſcribed; and if, upon the dividing the whole extent of the ſac, we find the entrance of the lacrymal duct ſufficiently open to give us room to hope that the tears may be reſtored to their natural courſe, injections muſt be made there every day till the paſſage is quite free; after which the external wound may be ſuffered to cloſe. Sometimes very ſmall *bougies* have been uſed with ſucceſs; but I would not adviſe them, for the reaſons before given. If we do not ſucceed in reſtoring the paſſage leading to the noſe, we muſt perforate the ſac and the *os unguis* in the ſame manner as has been before directed, applying alſo the ſame dreſſings.

Of Wounds of the HEAD.

WOUNDS in the head may be very different according to the inſtrument with which they are inflicted, and the nature of the part injured. The inſtrument which gave the ſtroke may either puncture, cut, or bruiſe; and the impreſſion received from it may be more or leſs deep: thus the ſoft and external parts only may be injured, or the ſkull and brain may have been hurt at the ſame time: and theſe differences in the wounds will neceſſarily be attended with different ſymptoms.

I DO not propoſe in this place to confine myſelf to the diſtinctions of theſe wounds which have in general been made by authors ſince *Hippocrates*, as I flatter myſelf the method I am about to lay down, will ſet this important ſubject in a clearer light.

light. I ſhall treat then, firſt, of wounds of the head made by puncture; ſecondly, of thoſe by inciſion; and thirdly, of contuſed wounds, as alſo of contuſions where there is no outward wound: nor can it be thought ſurprizing that I ſhould rank contuſions under the article of wounds, if we reflect that it is impoſſible to receive a bruiſe without having ſome ſmall blood veſſels ruptured under the ſkin. This then, I ſay, is the method I propoſe to proceed in, viz. to treat of wounds by puncture, inciſion, contuſion; and likewiſe of contuſions where there is no external wound. Each of theſe may affect the ſkin only; or they may at the ſame time affect the *aponeuroſis* formed by the union of the frontal and occipital muſcles, which covers greateſt part of the ſkull; and alſo injure the *pericranium*. They may extend likewiſe to the *cranium*, the *dura mater*, and the brain.

Of wounds affecting only the ſoft and external parts.

Wounds by puncture. Wounds that affect the ſkin only, by whatever inſtrument they are made, are ſo ſlight, and of ſo little conſequence, that it is not neceſſary to enlarge upon them.

If a puncture penetrates either to the common *aponeuroſis* of the frontal and occipital muſcles, or to the *pericranium*, it will produce an *eryſipelas*; for this ſymptom is almoſt inſeparable from a puncture in thoſe parts, and is owing to the ſmallneſs of the wound, which will not admit of a free diſcharge. In order to obviate this, we ſhould enlarge the wound by an inciſion, including therein the puncture, and bring on a ſuppuration as ſoon as poſſible; and though an *eryſipelas* may enſue, yet it will be far leſs conſiderable than if the inciſion had been omitted.

Wounds by incision.

A WOUND made by incifion is lefs dangerous than the former, and fhould, if poffible, be fpeedily reunited. If we cannot effect this, it fuppurates, and fometimes an *eryfipelas* feizes on the circumference of the wound, and perhaps on the whole head, in confequence of the wound made in the *aponeurofis*, or the *pericranium*; but this will go off by the fuppuration, and the ulcer, if properly dreffed afterwards, will not be long before it heals.

Wounds with contufion.

A CONTUSED wound in the *aponeurofis* may produce an *eryfipelas* extending all over the head. In this cafe it foon affects the *pericranium*, and fometimes produces fymptoms not unlike thofe which accompany a concuffion. This *eryfipelas* is followed by finufes, which extend more or lefs under the fkin about the circumference of the wound; for an *eryfipelas* affecting the tendinous parts terminates by a putrefaction of the part inflamed, unlefs prevented by the humour being difperfed. To obviate this accident, or at leaft to hinder its becoming very confiderable, we muft dilate the wound fufficiently at the beginning, as its being generally lacerated makes it neceffary to haften a fuppuration. If, notwithftanding this, an *eryfipelas* appears, and increafes fo as almoft to overfpread the *aponeurofis* (which would be liable to create bad fymptoms), fcarifications muft be made in feveral parts of the head, and efpecially upon the temporal mufcles, to relax the *pericranium*, which in fuch a cafe is too much diftended.

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The wound ſhould be dreſſed afterwards according as its different appearances require, not omitting the uſe of bleeding, and a proper regimen, as the reader may ſee in my *Obſervations*.

A contuſion without external wound.

A CONTUSION of the *aponeuroſis* may occaſion a ſuppuration, though this indeed ſeldom happens; but I have frequently known theſe contuſions ſucceeded by violent head-achs and wandering pains all over the head, which have continued ſeveral months.

Of wounds that affect the ſkull.

WOUNDS which affect the ſkull only, or the brain at the ſame time, are divided into three ſpecies; relative to the ſort of inſtrument with which they were inflicted, and the depth of the wound.

Wounds by puncture.

A SHARP pointed inſtrument, as a ſword for inſtance, may wound the ſkull either by a perpendicular, or an oblique ſtroke; in both which caſes it may penetrate the firſt table of the *cranium* only; it may penetrate both; or paſſing through the ſkull may wound the *dura mater*, and even the brain.

WHETHER the wound be made perpendicularly or obliquely, if it has only penetrated the firſt table, the ſecond can ſcarcely be injured, becauſe of the ſhape of the inſtrument; and if there has been any concuſſion either of the ſkull or brain, it could be but inconſiderable. If therefore any particular

ſymptoms enſue, they will be ſuch as proceed from the puncture of the *aponeuroſis* and the *pericranium*. This laſt conſideration however, joined to the poſſibility that the wound may have penetrated both tables, ſhould induce the ſurgeon to make an inciſion which may diſcover the bone at the part injured, including the puncture in the inciſion (the particular manner of making this inciſion will be more fully explained when we come to ſpeak of the method of trepanning). If upon examination we ſhould find that the inſtrument has not penetrated through the ſkull, ſtill the inciſion will be ſerviceable, to prevent the ſymptoms which might ariſe from puncturing the *aponeuroſis*; and may be of uſe likewiſe in curing the wounded bone, which will probably exfoliate (I forbear to mention the regimen to be enjoined the patient, as well as the evacuation by bleeding, which muſt be proportionable to his ſtrength and the nature of the ſymptoms, whether it be to correct thoſe that already appear, or to prevent others: Nor ſhall I ſpeak of theſe particulars in treating the following caſes, as I can give no other than general directions). But if the ſurgeon diſcovers that both tables are penetrated, he muſt apply the trepan either then or the next day, in order to lay bare the *dura mater*; and if the inſtrument has paſſed through that, he muſt enlarge the opening. This I look upon to be very neceſſary, becauſe there will certainly be a ſuppuration in the brain, which, unleſs the *pus* has a free diſcharge, will deſtroy the patient. When the operation of the trepan is finiſhed, the wound is to be dreſſed as will be hereafter directed. The aperture in the *dura mater*, which muſt be enlarged to the ſame bigneſs with the diameter of the crown of the tre-

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trepan, will give a free diſcharge to the *pus* as faſt as it forms; whereas had the trepan not been applied, and the wound in the *dura mater* dilated, the *pus* would neceſſarily collect in the brain, and do great injury there before it could poſſibly be diſcharged through the ſmall wound made in the *dura mater* by the inſtrument, and the too ſmall aperture in the ſkull. See my *Obſervations*, p. 85.

Wounds by inciſion.

The *cranium* may be wounded by a ſharp inſtrument ſtriking directly upon it, which authors have termed *ecopé* or a perpendicular inciſion; whereas when the ſtroke is given obliquely, they call it *diacopé*; or if received ſo obliquely as to take off a piece of the ſkull, they term it *apokeparniſmos*. In all theſe caſes, the inſtrument may have cut only the firſt table; it may have penetrated both; or have affected the *dura mater* and the brain.

In the *ecopé*, where the wound reaches no farther than through the firſt table to the *diploé*, the inciſion is not to be looked upon as the principal injury, ſince the ſecond table has certainly ſuffered, being either fractured or conſiderably ſhocked. If it is fractured, the *dura mater* is injured in that particular part, and an extravaſation of blood will enſue, and be ſoon attended with a drowſineſs. If it has only ſuffered a ſhock, which may be called a local commotion, the *dura mater* will probably ſuppurate in that part, and perhaps farther. See my *Obſervations*, page 91. It is very neceſſary to be well informed of the nature of the wound; for which purpoſe an inciſion muſt

be immediately made through the teguments to lay bare the bone. This being done, the surgeon should attentively observe what passes. If such symptoms supervene as denote an extravasation upon the *dura mater*, immediate recourse should be had to the trepan; but if there is only a local commotion, which may be known by the slightness of the symptoms, the operation must be deferred till the seventh or eighth day.

If the wound, which we before styled *ecopé*, extends visibly beyond the second table, the first table may be cut, because supported by the second; but the second, which has no support, is certainly fractured. In which case, after making the crucial incision, we are to apply the trepan as soon as possible; as some splinters of bones from the second table may puncture the *dura mater*, or perhaps the *dura mater* may have been wounded at the time the stroke was given.

If the wound in the bone is oblique, which is called *diacopé*, a crucial incision must be made, and the wound in the bone laid in view. Possibly the first table only may be cut, in which case, as the stroke is given obliquely, the second table may not have suffered either a concussion or fracture; so that we must proceed no farther unless some symptoms ensue which indicate the second table's being injured. If the second table is visibly cut, we must apply the trepan as soon as possible, since, as we before observed, it cannot, strictly speaking, be cut smooth and even, but must be fractured into splinters: in all these cases, whether the wound be made either by puncture or incision, the wounded part of the bone must be included in the crown of the trepan.

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THE wound by incision termed *apokeparnismos*, may have separated, and entirely carried away a piece of the two tables of the skull exclusive of the *dura mater*; or it may have taken off only the first table, and in that case, the *dura mater* probably is not injured, as the weapon did not press upon it. The first may be considered as an accidental trepan, the latter as a simple wound; and the more so, as the whole *cranium* underwent but a slight concussion. We should also regard those wounds as simple, if the flap of skin with the bone adhering to it, still retains such a union with the other teguments as to give hopes of its uniting by being replaced. In 1735, I found, in the churchyard at *Worms*, the skull of a person who had received such a wound with a sabre, upon the posterior part of one of the *ossa parietalia*. The piece of bone, which was round, and about an inch in diameter, had very probably been restored to its natural situation, together with the skin; for it was perfectly reunited with the *cranium*, and one might distinguish both on the internal surface, as well as externally, the *callus* which had cemented them. What was very remarkable (and shews the bone must have been replaced with very little care), one might see on the inside three small and very thin bony portions, which probably had been left between the *dura mater* and the piece of bone; to the last of which they were found united in its middle, and adhered there very strongly. As the *callus* was quite formed, and become solid like that which is found in fractures of the *femur*, and other large bones, the patient certainly recovered of this wound, and owed his death to some other cause.

If therefore we are called to drefs fuch a wound before the air has injured the *dura mater* and the bone; we ought, after having removed the grumous blood, the fplinters, or any other extraneous bodies, to replace the piece, and preferve it in its fituation by the dry future. It will be always time enough to remove it, if by the difcharge of matter we find it does not re-unite; and in this cafe the flap muft be intirely cut off, which will leave the wound in the fame condition as that where it was quite taken off by the ftroke of the fabre. The wound muft be dreffed afterwards as we fhall direct when we come to treat of the manner of applying the trepan.

The fame method muft be ufed if either the *dura mater* or part of the brain is cut with the bone.

The difference of the fymptoms proceeding from a concuffion, and thofe arifing from a fracture.

A weapon either round or flat, or, in a word, any inftrument that bruifes, may be ftruck againft the head with fuch force as to affect both the fkull and the brain by the blow. In which cafe there may either be no wound, not even in the fkin; or there may be a wound, penetrating more or lefs deep, that is, the bone may not be laid bare, or it may be laid bare, and likewife fractured. If there is a wound, the fcalp is never cut clean and even, but is contufed, and lacerated. In all thefe cafes, where we fuppofe the effect of the ftroke has reached beyond the teguments, the furgeon ought to know how to diftinguifh between the

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ſymptoms that proceed from the concuſſion and thoſe that are produced by the fracture of the *cranium*. Before I proceed therefore, I ſhall endeavour to ſhow the difference between thoſe ſymptoms; for ſince they ſerve as diagnoſtic ſigns, it is proper to be apprized of them, to prevent being miſtaken.

When we ſpeak of a commotion of the brain, we mean a concuſſion of all its conſtituent parts, occaſioned by a violent blow upon the head. This concuſſion may be either ſlight, or very conſiderable; and between theſe extremes we may conceive many intermediate degrees, depending upon the various forces of the concuſſion, as will hereafter appear.

This concuſſion interrupts the freedom of circulation in the veſſels of the brain and the *meninges*; and according to the violence of it, the courſe of the fluids is either ſuſpended for ſome moments only, or longer; it may alſo be intirely ſtopped in ſome of the veſſels, or ſome ſmall veſſels may be ruptured, and thereby occaſion extravaſations in ſeveral places. From theſe different diſorders, proceeds dimneſs of ſight, dizzineſs, loſs of ſenſe, drowſineſs, bleeding at the noſe, eyes, and ears, convulſions, palſy, and other ſymptoms which enſue as ſoon as the ſtroke is given. The degree and duration of theſe will be in proportion to the concuſſion, and the effect it has had upon the circulation. Thus when the concuſſion has been ſlight, the fluids, whoſe courſe has been but momentarily ſuſpended, ſoon paſs on again in their natural courſe, as the veſſels retain their elaſticity; and therefore the dimneſs of ſight, dizzineſs, and even the loſs of ſenſe, may quickly ceaſe. If the concuſſion

ſion has been more conſiderable, ſome of the veſſels have been thereby deprived, in ſome meaſure, of their elaſticity, and the fluids therein contained either circulate very ſlowly, their courſe being no longer accelerated by the elaſtic power of the veſſels; or elſe they abſolutely ſtagnate, till by plentiful bleeding, and a proper regimen, the veſſels are unloaded and recover ſtrength enough to propel the column of blood, the weight of which has been diminiſhed by the evacuations. In this caſe, the ſymptoms of the concuſſion continue till the natural order of the circulation is reſtored. But if the concuſſion has been very violent, the circulation is with great difficulty carried on within the *cranium*, whence the blood abounding in the external carotids may occaſion a rupture of ſome ſmall branches of them, and produce a hæmorrhage at the noſe, eyes, ears, &c. It may happen likewiſe, that ſome veſſels within the ſkull may either have been ruptured by the concuſſion, and ſmall extravaſations enſued from thence; or theſe veſſels may have ſo far loſt their elaſticity, that the blood which ſtagnates in them, obſtructs and burſts them by its too great quantity, and hence are produced ſtill further extravaſations. The conſequence of which is, that the former ſymptoms ſtill ſubſiſt, and even increaſe, becauſe theſe laſt extravaſations, being in the ſubſtance of the brain, will not admit relief by any chirurgical operation.

From this account it naturally follows, that the ſymptoms proceeding only from a concuſſion, begin immediately upon the ſtroke being given: let us now enquire whether thoſe which ariſe ſolely from a fracture of the ſkull, differ from theſe,

these, and whether they can be discerned at the instant the blow is received.

IN whatever manner the *cranium* is fractured, several fibres, by which the *dura mater* is attached to the *cranium*, must necessarily be ruptured. If the fracture be considerable, a great many of these fibres are broken, and if the bones are displaced, the *dura mater* may probably be lacerated. All this can never happen without occasioning an extravasation of blood, more or less considerable, immediately under the skull.

WHENEVER there is an extravasation of blood between the *dura mater* and the *cranium*, the *dura mater* is pressed in upon the brain. The same thing may happen from a piece of a fractured bone beaten inwardly, and the symptom ensuing from this pressure upon the brain, is drowsiness, as may be incontestibly proved from the two following circumstances: First, we generally find this lethargic disorder go off as soon as, by trepanning, a vent has been given for the blood extravasated upon the *dura mater*, or the depressed piece of bone has been raised. Secondly, there is no drowsiness in a large fracture of the skull, attended with a wound in the teguments, if the pieces of bone do not press upon the *dura mater*, and if the *cranium* is so fractured as to admit of a passage for the blood through the fissures, as fast as it is extravasated. See my *Observations*, pag. 71. This being granted, I say, first, that the drowsiness is a symptom proceeding from a compression upon the brain; secondly, that it is in proportion to the degree of compression that causes it; therefore the largeness of the vessels that are ruptured under the *cranium*, or the quantity of soft parts that are divided under it, will determine the great-

nefs of the extravafation, and confequently enable us to judge how foon the drowfinefs may begin to appear. Hence it is, that when the fracture is very confiderable, this fymptom very foon follows; whereas if the fracture is flight, it is many days before it is plainly perceived. This is what daily occurs in practice.

FROM what has been faid it is evident, that the firft fymptoms which appear after a violent blow upon the head, are the effects of the concuffion of the brain, and do not proceed from a fracture of the fkull; whereas thofe which do not appear till fome hours or days after the accident (fuppofing there were not any other fymptoms at firft, or if there were, and they had difappeared), thefe fecond fymptoms, I fay, are produced by the extravafation between the *dura mater* and the fractured *cranium*, or by an extravafation in the brain.

IT may be proper to add here, that in a very confiderable fracture, the drowfinefs proceeding from the extravafation upon the *dura mater* follows fo clofe upon the firft fymptoms arifing from the concuffion, that they are confounded together.

Wounds with contufion.

I HAVE already given an account of wounds in the fkull made by puncture and incifion; it remains now to fpeak of thofe made by contufion.

THOUGH nothing fhould appear externally but a contufion, that poffibly is the leaft injury that has happened, fince it may be attended with a concuffion; or the *cranium* may be fractured either at the

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contusion or in some other part; or else some of the sutures may happen to be displaced, and at the same time there may be a concussion and fracture; a strong concussion, if the fracture is slight; a slight concussion, if the fracture is large. There are many circumstances which may serve as indications of the present state of this disorder. First, the manner in which the blow is given: the stroke may have proceeded from the head itself, as when a man falls; in which case it is probable there has been a concussion, because the head cannot fall and rebound without undergoing an action and re-action instantaneously, that is, a motion tending to the centre in the head towards the earth, and a motion reverting from it in the head which rebounds from thence. The height from which the head descends, and the place it falls upon, as upon a pavement which is a solid body, or the earth which is somewhat softer, may assist our conjectures, and enable us to judge of the force of the concussion, and of the probability of a fracture.

The head may have received a stroke by an instrument more or less hard, which either fell upon it from a certain height, or was driven against it with force. If the patient did not fall with the stroke, the head remaining steddy, there is little or no concussion in that case, and the skull may be fractured. But if the patient fell when the blow was given, we must examine whether he fell only from the impulse of the stroke, or whether the fall was occasioned by the concussion. In the first case, the nature of the weapon will determine it to be either a concussion, fracture, or both together. In the second there has been a concussion in a greater or less degree.

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The next thing that may serve as a diagnostic is the instrument with which the blow was given. When the blow was given by the instrument, the surgeon is to consider the following circumstances, whereby he may judge whether there is a concussion or a fracture, viz. the bulk and strength of the instrument, its hardness, weight, and figure, its surface, as whether smooth or rough, the strength of him who gave the blow, his advantageous situation over the person wounded, and the disposition of his mind at that time; also the force which may have impelled any hard bodies against the head, as gunpowder, a sling, &c. To these should be added, the patient's age, the bones being soft in youth, and harder in proportion as he is advanced in life. The part of the head which was struck ought likewise to be considered, as the bones differ in their degree of thickness; and to all these signs let us add this one very essential reflexion, namely, If the bone is not fractured, it is certain that the whole force of the blow is transmitted to the brain, and has occasioned a concussion in a greater or less degree. If the bone yielded to the blow, and is fractured, the concussion is only communicated to the brain in proportion to the fracture: that is, the slighter the fracture is, the more the cuncussion is transmitted to the brain, and so *vice versa*.

The third diagnostic arises from the symptoms. We have before proved that the only symptom proceeding from the fracture is the drowsiness; and even that would not happen if there was a wound in the teguments sufficient to let out the blood extravasated under the *cranium* through the fissures in the fractured pieces. If therefore

there are any other ſymptoms, they proceed from the concuſſion.

THE fourth diagnoſtic ſign, is the time when the ſymptoms appear. I have already obſerved, that the firſt ſymptoms are the conſequences of the concuſſion, and that, upon their ceaſing, if others ſupervene, they are indications of a fracture, or at leaſt of ſome diſorder of the *dura mater*.

I RETURN now to wounds of the head made by an inſtrument that bruiſes. Whether the head is ſtruck againſt that, or that againſt the head, we find there are three different diſorders may enſue; namely, a contuſion without an external wound; a wound with contuſion where the bone is not laid bare; and a wound with contuſion where the bone is diſcovered. I ſhall begin with the firſt of theſe. And here, if upon a conſideration of the different circumſtances we judge there is a fracture, or even if there is any room to ſuſpect it, the bruiſed part ſhould be opened in its whole extent; and if after having made the inciſion, we find the bone bare, that is, if the *pericranium* is ſeparated from the ſkull, the bone has certainly ſuffered, and will require the trepan. But if the *pericranium* adheres, the *cranium* is not fractured, and the ſymptoms, if there have been any, are the conſequences of the concuſſion. We ſhould therefore treat the wound accordingly, by dreſſing it as a contuſed wound, and bringing it to ſuppuration; for it will be always time enough to apply the trepan, if any ſymptoms ſhould appear which indicate or give room to ſuſpect an extravaſation under the ſkull. We may be almoſt ſure, if there is an extravaſation, it is not between the *dura mater* and the *cranium*, but in the ſub-

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ſtance of the brain, as is certain from many obſervations.

WHAT I have ſaid concerning a contuſion may be applied to the contuſed wound where the bone is not evidently diſcovered. To which ſhould be added, that as the *aponeuroſis* has ſuffered, being laid bare and perhaps wounded, we muſt enlarge the wound in the common teguments by an inciſion, in order, if the *aponeuroſis* is lacerated, to dilate it, and thereby prevent the *eryſipelas* and tumefaction, which will enſue if this is not done. Beſides, as the inſtrument with which the ſtroke was inflicted was angular, as appears by its having made a lacerated wound, it is poſſible the *cranium* may be fractured, even though the ſtroke was given obliquely; therefore, in making this inciſion, the *pericranium*, which may be lacerated alſo, ought to be divided, to avoid the neceſſity of proceeding to a ſecond operation, if after ſome days ſuch ſymptoms ſhould appear as indicate a fracture. This inciſion muſt be continued the whole length of the contuſion that accompanies the wound, as it has often happened that in wounds made with an oblique ſtroke, the ſkull has been fractured at ſome diſtance from the part lacerated, towards one of the two angles. If upon making this inciſion we find the *pericranium* ſeparated from the *cranium*, or that it adheres but very ſlightly, we may conclude that the bone has ſuffered; and if there is a fracture, the *pericranium* will certainly be found ſeparated at that part. I muſt repeat it once more, that in order to form a juſt prognoſtic, and to proceed properly in regard to the regimen, bleedings, and other remedies, we muſt daily conſider every circumſtance before-men-

mentioned ferving to diftinguifh the difference of the fymptoms between a concuffion and a fracture.

If in a contufed wound the bone is laid bare and expofed, there is no great difficulty to difcover the fracture, unlefs it be in the internal table only.

The different forts of fractures of the cranium.

Sometimes there is only a fiffure; to which the antients have given the name of *Rogmé*. Now, whether this fiffure be of greater or lefs extent, that particular makes no alteration in the diftinction, nor will any degree of it admit of a cure without the application of the trepan.

If the length of the fiffure makes any difference in practice, it is this: the extravafation being made more flowly in a fmall one than in a larger, the drowfinefs confequently does not come on fo foon, and therefore we need not be in hafte to apply the trepan; for it is neceffary there fhould be blood enough extravafated under the fkull to feparate from the *dura mater* the piece of bone which is to be taken out; and this we may be affured there is, if the drowfinefs comes on. Whatever may be the extent of the fiffure, the extravafation always happens at the part where the ftroke was given; and it is there the trepan muft be applied, including the fiffure in the circumference of the fawed piece. But if the fiffure is very long, the application of this firft trepan is by no means a reafon why others fhould not be made in different places along the extent of the fiffure; for, fuppofing that there fhould be no extravafation under the fiffure,

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yet the *dura mater* is injured in that part, and will ſuppurate. This will be ſtill more neceſſary if the fracture, notwithſtanding the intervention of a future, extends from one bone to another adjoining to it; for the *dura mater*, which is more ſtrongly united to the ſkull at the futures, prevents any communication between the extremities of the fiſſure, unleſs the extravaſated blood has deſtroyed the adheſion.

THE bone may be broken into ſeveral pieces, and yet thoſe of the external table not at all depreſſed, or unequal in their ſurface, whilſt thoſe of the internal table may. In this caſe, we muſt endeavour to take out one of the pieces; in order to which it may be neceſſary to apply the crown of the trepan on the ſide of the fracture. One piece being removed, the others are eaſily extracted, and the operation of the trepan is then finiſhed, nothing more remaining to be done than with the *lenticular* to remove the angles and inequalities in the circumference of the opening, which, in this caſe, is very ſeldom circular.

BUT the fractured pieces may be depreſſed and drove in upon the *dura mater*: in this caſe, if the pieces are ſmall, they ſhould be all taken out, which may be done without much difficulty; but, if they are large, we are ſometimes obliged to apply the trepan on the ſide of the fracture, in order to introduce an *elevator* through the aperture to raiſe up the pieces which preſs upon the *dura mater*.

SOMETIMES theſe pieces are large, but depreſſed on one ſide only, and adhere for a conſiderable ſpace to the *dura mater*, from which they are only diſunited in part; and adhere alſo to the *pericranium*, the teguments being unhurt. In this

caſe,

case, the ſide that is depreſſed muſt be raiſed and placed upon a level with the *cranium*; and if, in the courſe of the dreſſings, the ſkin grows red and eryſipelatous along the fiſſure that joins this piece to the ſound bone, we muſt make an inciſion there, when we ſhall certainly find the *pericranium* ſeparated: the trepan, therefore, ſhould be applied in one or more places, as the *dura mater* will come to ſuppuration underneath the fiſſure in the ſame manner as the *pericranium* does upon it.

FISSURES ſometimes begin at the place where the bone is fractured, and from whence ſeveral fragments have been extracted; and theſe fiſſures may extend a conſiderable way. The method of treating them is the ſame as in the preceding inſtance, where the teguments grow inflamed. If this is neglected, the *dura mater* putrefies as far as it has been injured, and the putrefaction extending to the *pia mater* ſpreads afterwards to the brain, and the patient dies. See my *Obſervations*, page 96.

IF theſe fiſſures do not extend very far, it is poſſible the large aperture made in the ſkull by the removal of the fractured pieces may afford a ſufficient vent to the *pus*, and admit of remedies being paſſed under the *cranium* along the fiſſure; for which reaſon, I would not propoſe making the inciſion the whole length of the fiſſure, till we diſcover a redneſs in the ſkin.

WHETHER the fractured pieces are depreſſed or not, it is very ſeldom the fracture of the internal table anſwers exactly to that of the external; and daily experience ſhews us, that when the ſkull is broke into ſeveral pieces, the fracture ef the internal table almoſt always extends farther than that

of the external. Upon which account, we ought in all these cases to pass a blunt probe round the circumference of the aperture, between the *dura mater* and *cranium*, in order to discover whether there is any splinter separated from the internal table that pricks the *dura mater*. If we meet with one, and it is situated at a distance from the aperture, the method of removing it must be by applying the trepan upon it; for if we attempt to extract it by any other means, the points of it may lacerate the *dura mater*.

It is impossible to discover a fracture of the internal table, when the external is not broken; for though this accident must certainly proceed from a violent blow, yet the fracture is slight: at the same time there must have been a considerable concussion of the brain, as the whole force of the blow was transmitted to that, the external table having resisted the shock without breaking. I never saw but one instance of this; and the patient dying, we found, upon examination, on the opposite side of the brain to where the blow was received, several clots of extravasated blood, occasioned by the rupture of some small vessels, the effect of the concussion. In this case therefore the application of the trepan, even upon the fractured part (though that could only be made by chance) would have availed nothing. See my *Observations*, page 62.

It is equally impossible, as soon as the blow is given, to discover the separation of a suture, unless the suture is situated exactly at the part where the stroke fell; for if it be in any other place, it cannot be known till some days afterwards, when a redness of the skin appears from an inflammation of the *pericranium*. In such a case, we cannot

not propose to make an incision any farther than the inflammation has produced a suppuration, the matter of which is distinguishable under the finger; and the only means to prevent this suppuration is by applying emollient cataplasms to relax the parts that are distended by the separation of the sutures, and procure a resolution of the fluids; the stagnation of which gave rise to the swelling and redness.

LASTLY, there may be a contused wound, where the bone is laid bare, but not fractured. In this case, the manner in which the blow was given will determine the nature of the accident. If it was given very obliquely, the bone may have suffered but little, and the *cranium* and brain have undergone only a slight concussion. If the stroke fell rather in a direct than oblique manner, the bone is contused; and as it afforded a resistance, the concussion of the brain will be proportionable to the force of the blow. By examining, therefore, into the different degrees of obliquity in which the stroke was given, and the nature of the symptoms, the surgeon is to judge whether the application of the trepan will be useful or not. If the *cranium* has received a very violent blow without being fractured at the part struck upon, it is possible there may be one or more fractures elsewhere. Suppose, for instance, a man falls perpendicularly with his head downwards. The weight of the body lies upon the *basis* of the *cranium*, whilst the *cranium* itself is struck on the *vertex*. If the bone resists at that part, there may, and indeed necessarily must be, a fracture on one or both sides of the head, in the same manner as by making a strong pressure upon a hoop, we crack it on each side. Instances of these fractures

have occurred, though in general they are not known till after the patient's death. If any thing can give us room to ſuſpect or diſcover ſuch an accident, it is a redneſs appearing in the ſkin that covers theſe fractures; which redneſs cannot be ſeen till after ſome days, becauſe the inflammation of the ſkin is only a conſequence of an inflammation of the *pericranium*. If the accident allows us time to diſcover it, we muſt apply the trepan.

PROGNOSTIC. Our prognoſtic, in regard to the different wounds that we have juſt now enumerated, ought to be formed from a conſideration of the following particulars, viz. the nature of the diſorder, the nature of the part injured, the ſymptoms that already appear, or thoſe that may probably enſue.

THE exact account I have given of the different ways by which the head may be wounded, the ſeveral degrees of the wound, and the diſorders that may reſult from thence, will, I preſume, make it eaſy to form a juſt prognoſtic in theſe caſes; and as I cannot enlarge upon this ſubject without uſeleſs repetitions, I ſhall paſs on to the manner of applying the trepan.

The manner of applying the trepan.

SUPPOSING a perſon has received a hurt upon the head, it ſhould be the ſurgeon's firſt care to diſcover as much as poſſible the extent of the injury; for the patient may be hurt only in one part; or he may be hurt in ſeveral, eſpecially if he fell upon the ground. The whole head therefore ſhould be immediately ſhaved and well examined, when we ſhall diſcover perhaps only a violent contuſion; or there may be a wound made

by puncture, incision, or contusion; and in this last instance, the bone is either laid bare or not. I speak here only of such cases, where the trepan may be properly used.

If there is a contusion without an external wound, the extent of the contusion ought to determine the figure of the incision, which must be crucial, angular, or in the form of a T, according to the place upon which it is to be made. And in this respect the vicinity of a suture, which ought not to be exposed unnecessarily, will make one method preferable to another. If it is allowable to chuse the figure of the incision, I should prefer either that in the form of a T, or that of an angular shape, rather than the crucial, as the last requires three incisions, whereas the others are made with two: add to this, that the crucial incision leaves four angles to be cut off, the others fewer, so as to spare the patient a considerable deal of pain.

The incision is to be made with a sharp-pointed bistory; and it is proposed by authors to thrust the point directly down to the *cranium*, and then carry on the incision as far as is necessary, still bearing upon the point, in order to divide the *pericranium* and the teguments together; but this is a method to be pursued with great caution, since if the *cranium* is broken into pieces, the point of the bistory may happen to slip between them, and plunge directly upon the brain. When the angles of the incision are very large, part of them must be taken off; but no more than is necessary in proportion to the fracture, as the surgeon should endeavour to save as much of the scalp as possible. Particular care should be taken to separate the *pericranium* very well at the angles.

When the wound has been made by a puncture or incision, and the *pericranium* is not separated, the point of the bistory must be passed through the teguments down to the bone, in order to divide the *pericranium* together with them. This done, either with the nails or a *spatula*, we must separate the *pericranium*, which adheres to the skull very closely, and then cut off part of the lips of the wound. Where the wound is made by a bruising instrument, the *aponeurosis* is contused, and sometimes also the *pericranium*; the *aponeurosis* may likewise be lacerated. In these cases, the wound must be dilated and the bone laid bare, to which the contused *pericranium* sometimes adheres but very slightly; and the wound should be made uniform by cutting off the lips. Once more, let me observe that the *aponeurosis* and *pericranium* be well separated at the angles.

If the bone is bare, there is sometimes nothing more to do than to cut off the teguments that are lacerated and contused; at other times, it is necessary to enlarge the wound by incision, to give room for the application of the trepan, and to discover all the fractured pieces.

These incisions will be attended with an hæmorrhage, which, in general, may be easily stopt with dry lint. If any small artery is opened, you must pinch the extremity of it so as to make a contusion, or else apply upon it a little dry lint dipt in styptic water; and when the wound has done bleeding, we may apply the trepan.

We are forbid by authors to put a trepan upon the sutures, because the *dura mater* adheres there more strongly than in other parts of the *cranium*; and they particularly forbid it upon the sagittal suture, because of the longitudinal *sinus* that lies

underneath. They likewiſe prohibit the uſe of it upon the temporal bones, becauſe of the arteries of the *dura mater* which are lodged in the *ſulci* formed in the internal ſurface of thoſe bones. Theſe precautions might be very proper if the trepan was applied when there is no blood extravaſated between the *dura mater* and *cranium*; but as the extravaſation of blood has certainly deſtroyed the adheſion of the *dura mater* to the *cranium* (tho' the extravaſation is lodged under a ſuture, even under the ſagittal ſuture), therefore all the fibres which formed the adheſion before the extravaſation, are certainly broke; ſo that in this caſe we may trepan upon any ſuture whatever. It is the ſame thing with regard to the *oſſa tempora*; the extravaſated blood ſeparates the *dura mater* from the ſkull, and the arteries before-mentioned are then no longer lodged in their *ſulci*.

The inſtrument made uſe of for this operation is termed a trepan, which is a ſaw made in the form of a crown, in the middle of which is fixed a pyramid that ſerves to keep the crown ſteddy.

The patient being ſituated in a proper manner, if the point of the pyramid is ſharp enough to enter the bone, I place it on a firm part very near the fracture or fiſſure; ſo that the crown of the trepan may include that part of the bone which has been injured. If the pyramid is not ſharp, I uſe a *perforator* in order to make an impreſſion in the bone ſufficient to receive the pyramid, which is deſigned to fix the crown ſo as to prevent its being diſplaced during the operation. The pyramid being properly placed, I make ſeveral turns with the crown upon the firſt table, and form an impreſſion of ſuch a depth as may be ſufficient to fix the trepan in the bone, rendering thereby

thereby the further uſe of the pyramid unneceſſary. After this, I make a half-turn with the crown a contrary way to diſengage the teeth, and, taking out the crown, I remove the pyramid; and whilſt an aſſiſtant cleans the teeth of the ſaw with a bruſh, I wipe away the duſt that lies in the impreſſion. I then replace the crown in the impreſſion, and fixing it ſo as to bear equally on every part, I turn it about with a moderate degree of preſſure, till the ſaw-duſt begins to appear red, which ſhews we are got to the *diploé*.

Some craniums are ſo thin that the *diploé* does not tinge the duſt red, eſpecially in old people. In this caſe, we muſt proceed very cautiouſly, and take out the crown frequently (which would be proper indeed if it was only to clean it), obſerving alſo to wipe away the duſt that might otherwiſe hinder the working of the teeth. While the trepan is cleaning, I feel with a blunt tooth-pick, or a flat blunt probe, whether I have penetrated any part of the inner table; and examine likewiſe if the impreſſion is leſs deep on one ſide than another, that I may afterwards bear harder, where the crown has made leaſt impreſſion. If I find that I have got through any part of the internal table, I then preſs lightly upon the trepanned piece of bone, or endeavour to take it out; but without uſing any force, leſt I ſhould bring away only the firſt table. If it ſtill remains faſt, I apply the crown again, making a few turns more, and as ſoon as I perceive the piece looſe, I extract it with the forceps.

When the piece is taken out, we muſt ſmooth the lower edge of the internal table with the *lenticular*. If the blood that is extravaſated upon the *dura mater* is ſtill fluid, it paſſes through the perforation

foration in the *cranium*; but to make it come out more readily, I preſs lightly upon the *dura mater* with the *lenticular*, and then abſorb it with lint. Oftentimes this blood is coagulated, and comes away gradually by a kind of ſuppuration. If there are any pieces of bone depreſſed, I raiſe them with the *elevator*, taking care, whilſt I am doing this, not to force others in. The *elevator* invented by Monſ. *Petit* is, I think, preferable to any other, as it has ſtrength and ſafety united with convenience.

If the *dura mater* is penetrated, I take a lancet and enlarge the wound as much as poſſible by a crucial inciſion; for there will certainly be a ſuppuration in the brain, and it is proper the *pus* ſhould have a free diſcharge.

If there is any veſſel under the *cranium* that bleeds, the orifice of the trepan muſt be ſtopped with lint, ſo as to prevent the blood from paſſing out. This will neceſſarily form a *coagulum* there that will cloſe up the mouth of the opened veſſel; and it would be improper either to make a compreſſion upon the *dura mater*, or to apply any ſtyptic.

We ſhould be careful when we remove the dreſſings not to take away the firſt pledgets, or the ſindon that adheres to the coagulated blood, unleſs it preſſes upon the *dura mater*.

The dreſſings being removed, we diſcover the *dura mater*, which is either in a ſound ſtate, and appears of a reddiſh colour; or it is diſeaſed, and looks either very red, livid, or quite white. If it be in a ſound ſtate, we are to apply a *ſindon* upon it dipt in a mixture of honey of roſes, and brandy. If it is very red, it is a proof of its being inflamed, and muſt be dreſſed in the ſame manner:

but

but if it is quite white, or of a livid colour, it ſhould be brought to ſuppuration; and therefore the *ſindon* ſhould be dipt, either in the green balſam or a mixture of honey of roſes and ſpirit of turpentine, in order to haſten digeſtion. The *ſindon* ſhould be covered with ſmall pledgets that fill up the perforation, the reſt of the wound being dreſſed according to art, and the whole kept on with compreſſes, and the bandage ſtiled the *couvre-chef*. The ſame dreſſings will be neceſſary if the *dura mater* is lacerated, as in that caſe likewiſe the *dura mater* ſhould be brought to ſuppuration. It ſometimes happens, in the courſe of the dreſſings, that the *dura mater* being puſhed outward by the brain, fills up the aperture in the *cranium*. To prevent this, the *dura mater* muſt be ſupported with a pledget of lint made in the form of the trepanned piece of bone, but applied ſo as not to preſs upon the *dura mater*. This pledget ſhould be ſecured in its ſituation with a ſmall plate of lead, placed between the compreſſes, and ſupported by the reſt of the dreſſings. In large fractures where ſeveral pieces of bone have been extracted, the *dura mater* is ſtill more liable to riſe; and is to be prevented in much the ſame manner, by applying a plate of lead ſhaped like the wound in the bone, or elſe a paſte-board cut in the ſame form, and laid over the firſt ſindon, ſo as by its thickneſs to ſupply the place of the extracted fragments. For want of theſe precautions, I have ſometimes ſeen the *dura mater* elevated above the perforation, and form a *fungus*, the *baſis* of which was narrower than its upper part.

This tumor muſt neceſſarily enſue as ſoon as the *dura mater* riſes above the external edge of the perforation, which forms a kind of liga-

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ture or ſtrangulation there; not ſufficient indeed to bring on a mortification, but conſiderable enough to obſtruct the return of the blood, and thereby occaſion a ſwelling and diſtention of the ſuperior part of the tumor. The method to be purſued in this caſe, is cutting off the tumor, even though the brain itſelf makes a part of it; for compreſſion alone will not be ſufficient. It has been propoſed, in order to extirpate this fungus, to make a ligature at the root of it, even with the ſkull; but this would be apt to give very great pain, and might bring on an obſtruction and an inflammation of the *dura mater*.

I SHOULD think it better, therefore, to cut it off even with the ſkull, and afterwards ſtop the ſlight hæmorrhage that may enſue by a gentle compreſſion. The dreſſings muſt be continued in much the ſame manner as was before deſcribed; covering the bones with dry lint, and applying ſuch other remedies to the reſt of the wound as appear proper.

WE ſhall afterwards find that the *dura mater*, according to the ſtate it is in, will ſooner or later granulate fleſh, which will unite it to the internal ſurface of the *cranium*, from which the extravaſated blood had ſeparated it: and likewiſe that, according to the patient's age, the bone will exfoliate, both at the circumference of the perforation, and at the ſurface of the *cranium*, which was laid bare. The fleſh ſhooting out afterwards from the bone and the *dura mater*, will unite and fill up the orifice of the trepan, and the wound will ſoon heal.

IF a perſon that has been trepanned and recovers, dies ſome time afterwards, we ſhall find, upon an examination of the parts, that half of the

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perforation is filled with a thin *callus*, which is formed by the offific matter oozing out of the circumference of the aperture, and the reft of it clofed by the cicatrix. For this reafon, a patient fhould be very careful after he is cured, not only to keep this part of the head very warm, but alfo to cover it with a plate of filver or tin, to defend it againft any accidental blow; which, though flight, might caufe a contufion in the brain, and coft him his life.

Of ANEURISMS.

ANEURISMS are formed by the collection of a certain quantity of arterial blood, and are diftinguifhed under the denominations of true and falfe. In the firft of thefe, the artery is dilated, and the blood which forms the fwelling is ftill inclofed within its proper veffel. In the falfe aneurifm, the artery is opened, and the blood that comes out of it, diffufes about the aperture, and lodging itfelf in the adjacent parts, raifes up the teguments by its bulk.

The true aneurifm.

THE true aneurifm may be divided into three kinds: in the firft, the whole body of the artery is dilated in a greater or lefs extent, forming a round, or rather oblong tumor; the *bafis* of which is generally broader than its furface. In this cafe, all the coats of the artery have loft their elafticity, and have yielded to the quantity of blood, but-

bert are yet intire. One would imagine that these membranes should likewise have lost somewhat of their thickness at the same time that they had given way to the fluid contained in them; but, on the contrary, we find they acquire a greater degree of thickness in proportion to their distension. In the second kind of true aneurism, one of the coats of the artery is ruptured, and the others, being unable of themselves to resist the impulse of the blood, are enlarged, and form almost a round tumor, narrow at its basis, and broad at its upper part. The third species is a composition of the two former, for the whole body of the artery within a certain space is dilated; and in the middle of this dilatation arises another tumor, like that of the second kind of aneurism, the cavity of which communicates internally with the dilated artery. These three sorts of aneurisms may be of different sizes, which in general depends upon the time from which they began to form.

These aneurisms may happen either in the principal trunk of an artery, or in one of the branches; in the great cavities of the body, as the breast and belly, or in the extremities. The blood that fills these tumors is always fluid, by being constantly renewed; that is, as fast as one drop enters another passes out, and continues its course in the circulation: but, notwithstanding this blood is fluid, its passage in the tumor is retarded; and this remission in its motion, which is more or less considerable, according to the size of the aneurism, occasions some of the fibrous parts of the blood to separate continurlly from the red part, and adhering to the internal coat of the aneurismal bag, it there forms fibrous *strata*, which might be taken for real membranes, for they

they harden ſo in time as to deceive peopl: who have never opened ſuch kind of tumors. As ſoon as the firſt *ſtratum* is hardened, another is formed within it; ſo that many ſuch may be found adhering together, and are harder or ſofter, according as they are at a greater or leſs diſtance from the courſe of the fluid.

CAUSES. To produce a true aneuriſm, the texture of the artery muſt be weaker in one part than another. It is ſeldom this happens from an internal cauſe; though, as the ſubſtance of the artery is formed like the other ſoft parts, viz. of a *congeries* of all kinds of veſſels, it is conſequently liable to the ſame diſorders to which they are incident, even the venereal and ſcorbutic *virus*, *&c.* Hence then, I ſay, the texture of the artery may become weaker than ordinary in ſome particular part; but blows, ſtrains, and violent extenſions are the more general cauſes. The coats of the artery loſing their elaſticity in the part hurt, yield to the quantity and force of the fluid that circulates in them; the aneuriſm begins then to form, and afterwards gradually increaſes.

WE likewiſe find true aneuriſms produced by ſome other external cauſes, as by bleeding, or from a wound with ſome pointed or ſharp inſtrument. Either the *capſula* which ſometimes inveſts the artery, or one of the coats of the artery itſelf, having been hereby opened, the other coats are rendered weaker in that part; but in all theſe caſes, the artery is not entirely opened, and the blood ſtill remains within it.

SIGNS. There are particular ſigns which diſcover the different ſpecies of aneuriſms, and diſtinguiſh them from all other tumors.

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The true aneurifm forms a tumor almoft alway indolent, and more or lefs elevated. At firft this fwelling is foft, but as fibrous *ftrata* are in time formed within the aneurifmal bag, it in fome meafure lofes its foftnefs. Upon laying a finger upon the tumor, you may difcover a beating, which anfwers to the patient's pulfe, and by preffing upon it, if the tumor is recent, it entirely fubfides, the blood that filled it returning into the artery; but it appears again as foon as the preffure is removed. If the diforder is of long ftanding, the fwelling fubfides only in part by compreffion, becaufe of the fibrous *ftrata* which continue in the tumor; and it refumes its former fize when the preffure is withdrawn.

If the aneurifm has a narrow *bafis*, the fluid blood when it re-enters the artery by the preffure occafions a fort of hiffing.

Prognostic. The true aneurifm is more or lefs dangerous according to the place in which it is fituated. If it happens to be in a part where the affiftance of furgery cannot be employed, it will in time prove mortal, as the artery, by being over diftended, will at laft burft; but if it be fituated within reach, the aneurifm may be cured; at moft can only occafion the lofs of the limb, and this only if it happens to affect the trunk of an artery which is abfolutely neceffary for the prefervation of that limb.

Cure. The cure is either palliative or radical. The palliative cure confifts in the application of a bandage furnifhed with a pellet or a piece of lead, which preffing upon the part of the artery that is dilated, fupports it, and prevents it from yielding any further to the blood, which conftantly tends to

 dilate

dilate it. Small and recent aneurifms may in time be cured by this means, if they are fituated in a part which will allow the compreffion to be continued; but as to large aneurifms, there is no hopes of curing them by this method, both because of the fibrous *ftrata* formed within the tumor which cannot be difperfed, and becaufe the compreffion waftes, and at laft wears away all the coats of the artery, and even the fkin that covers it; in fo much that they burft, and the patients are deftroyed by the hæmorrhage. The operation therefore is the only means can be propofed, provided the tumor is fo fituated as to admit of it. But if, from the fituation of the aneurifm, the operation is impracticable, we muft have recourfe to the bandage. This however muft be applied with caution, that is, the pellet or piece of lead ought only to be fuch as will be juft fufficient to prevent the tumor from increafing. At the fame time the *plethora* fhould be abated in proportion to the patient's ftrength; for, by emptying the veffels in general, we reftrain the force of the circulation, which always tends to dilate the aneurifmal bag. See my *Obfervations*, page 148.

THE radical cure is effected by a chirurgical operation.

I WILL fuppofe the aneurifm in the bending of the arm: having prepared the patient by bleeding, a regimen, and other fuitable precautions, the limb muft be held by an affiftant. I then apply a ligature upon the upper part of the arm, tightening it fufficiently with the *tourniquet*, to fecure the hæmorrhage from interrupting our work (I fhall fhow under the article of *Amputations* the different kinds of ligatures with the *tourniquet*, and alfo how to apply them). I then make a longitudinal inci-

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ſion through the teguments of the tumor, and lay bare the *capſula* of the artery, extending this inciſion beyond the aneuriſmal bag, and carefully dividing the *aponeuroſis* of the *biceps* which covers it. But in making the inciſion we muſt proceed with great caution, leſt we ſhould open the bag at the ſame time with the ſkin, for frequently the *aponeuroſis* of the *biceps*, as alſo the *capſula*, the bag, and the ſkin ſeem united; eſpecially if the patient has for any conſiderable time worn a bandage upon the tumor.

Having diſcovered the *capſula*, I divide it beyond the extent of the bag, and with the ſpunge wipe away the blood, to have a plain view of the artery; then ordering the *tourniquet* to be looſened, we clearly diſcover the extent of the aneuriſm, and I immediately direct the *tourniquet* to be tightened again: after this, I make a double ligature upon the artery, taking as much care as poſſible to avoid tying the nerve which accompanies it in the *capſula*. The method of doing this is by paſſing one needle underneath the artery and above the bag, and another needle below the bag; then tye the upper ligature, and afterwards the other, leaving the ends of the threads very long. Having thus ſecured the hæmorrhage, I lay open the whole aneuriſmal bag, and cut away a good part of it from each ſide. The reſt of the operation muſt be performed in the manner as will be hereafter directed for the falſe aneuriſm.

The falſe Aneuriſm.

The falſe aneuriſm may be of ſeveral kinds; it ſomeimes happens that a true aneuriſm burſts

by ſome ſtrain or the application of an ill-adjuſted bandage upon the tumor to hinder its increaſe; and thus a falſe aneuriſm may be produced.

An artery ruptured under the ſkin forms an aneuriſmal tumor, or a falſe aneuriſm. I have often ſeen this ſpecies of aneuriſm ariſe on the head after a blow, or when the hair has been violently pulled: by which means ſome branch of an artery had been ruptured, and the blood extravaſated under the *aponeuroſis* of the frontal and occipital muſcles. Others alſo of the ſame kind may happen in other parts. In theſe aneuriſms the greateſt part of the extravaſated blood is fluid.

An opening made in an artery in the thick or middle part of a limb by a pointed inſtrument, as a ſword, lancet, &c. makes a third and fourth ſort of falſe aneuriſm.

In the third ſort, the blood is incloſed in the *capſula* of the artery. This ſometimes ariſes from the artery having been opened by bleeding, and where the hæmorrhage has been ſtopt by applications. In which caſe the orifice of the ſkin, as alſo that in the *aponeuroſis* of the *biceps* and in the *capſula* have cicatrized, but that in the artery not being cloſed, ſtill admits the blood through it. This blood paſſes only within the *capſula* of the artery, and ſpreads but very little, that is, in proportion as the *capſula* gives way to the blood, which extravaſates ſlowly.

In the fourth kind, the blood which comes out from the artery diffuſes itſelf gradually all over the limb, that is, in the cellular ſubſtance of the fat between the muſcles, and likewiſe under the ſkin; by this means forming an unequal tumor, or rather ſeveral tumors lying in contact one

with

with another: the blood in these is partly grumous and partly fluid.

SIGNS. The signs of the false aneurisms differ in many respects from those which we have observed to denote the true aneurisms; and they distinguish likewise each particular kind.

THE first we took notice of, is easily known from the following circumstances, viz. the account which the patient gives of his having had an aneurismal tumor, of his having worn a compressive bandage upon it, and the manner of the blood's passing out.

IT is more difficult to discover the second sort. The tumor is more or less extensive and almost indolent, feels soft, and has a fluctuation in it like matter in an abscess. It increases gradually and without any discoloration of the skin, because of the blood's being extravasated under an *aponeurosis*. These circumstances, joined to the patient's own account, are indications of the nature of the disorder. If the blood is not collected under an *aponeurosis*, the swelling is attended with little pain, and increases gradually; the skin in several places appears yellow, or of a red colour, the extravasated blood having reached the cells of the *panniculus adiposus*, and diffused itself there.

IF the artery that has been opened is inclosed within a *capsula*, like that at the bending of the arm, and this *capsula* has closed again with the teguments by the care that has been taken to stop the hæmorrhage (which often happens after bleeding, where an artery has been opened), the swelling is almost free from pain, and the colour of the skin unchanged; and if it is recent, the blood returns again into the artery upon pressure, with a sort of hissing. These circumstances have some-

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times occaſioned this tumor to be miſtaken for a true aneuriſm, and the only means of diſtinguiſhing them is by informing ourſelves of what has previouſly happened.

To conclude, if the blood does not ſtop within the *capſula*, but ſpreads between the interſtices of the muſcles, the tumor daily increaſes, grows hard, painful, unequal; and the colour of the ſkin in ſeveral places appears marbled, according as the extravaſated blood has extended.

As theſe ſigns ſerve to diſcover the different kinds of aneuriſms, ſo they diſtinguiſh them likewiſe from any other tumors.

Prognostic and Cure. We have ſeen the four ſorts of falſe aneuriſms.

The firſt, at the beginning was a true aneuriſm, which afterwards became a ſpecies of the falſe aneuriſm by the opening of the aneuriſmal bag and the ſkin that covered it. If this is ſituated in a part where a ligature can be made upon the artery, it ſhould be applied as ſoon as poſſible; but if the ligature cannot be made, we muſt endeavour by compreſſion, to prevent the blood's extravaſating, and in ſome meaſure prolong the patient's days, though they cannot be many.

In the ſecond caſe, where there is a branch of an artery ruptured under the ſkin, no palliative cure can be obtained, but the whole tumor muſt be laid open and a ſlight compreſſion made upon the bleeding artery. This will be ſufficient to ſtop the hæmorrhage, as theſe arteries are ſmall; and the wound may be dreſſed afterwards like a ſimple wound.

Though, in the third kind, the blood, which is only extravaſated within the *capſula*, returns into the artery upon preſſing the tumor, yet it is very ſeldom

ſeldom the aneuriſm can be cured by any other means than by the operation, becauſe of the great difficulty of procuring a re-union of the artery.

LASTLY, when, as in the fourth caſe, the extravaſated blood has diffuſed itſelf either in one or more cavities, which it has formed by inſinuating itſelf between the adjacent muſcles, there is hardly ever any other remedy than the operation: I ſay, hardly ever, becauſe ſometimes, though ſeldom, they have been cured by compreſſion.

SUPPOSING the aneuriſm in the arm, the compreſſion may be made with a pellet of about an inch in diameter, from which proceed two leathern ſtraps that are faſtened with buckles upon the pellet. Theſe ſtraps go round the arm, ſo that the pellet, being properly fixed, cannot be diſplaced; and the two buckles allow of tightening the bandage, without either diſplacing the pellet, or removing the preſſure upon the part affected. If it ſhould be thought expedient to try this method, we muſt diſtinguiſh the place where the artery is opened from the ſwelling formed by the extravaſated blood; for it is only upon the orifice of the artery that the preſſure is to be made, and not upon the reſt of the tumor; and as the extravaſated blood is conſtantly quitting the place where the compreſſion is made, ſpreading itſelf about the adjacent parts, the bandage muſt be occaſionally tightened, otherwiſe a freſh ſupply of blood would be daily furniſhed from the aperture. By theſe precautions it is poſſible that a hard, dry clot may be formed upon the aperture, and cloſe it up, whilſt the extravaſated blood, by the uſe of reſolvents over all the limb, tranſpires through the ſkin. If, however, the patient recovers by this

means, he must still wear a bandage to support this clot.

THIS method of cure by compression may be placed among the number of palliatives, and our inducements to try it ought to depend upon the following circumstances, viz. It is necessary, if we use it, that the opening in the *aponeurosis* of the *biceps* and in the *capsula* should not have occasioned an inflammation; for if it has, or if the clots of coagulated blood, which are as so many extraneous bodies, already occasion such a compression as to endanger a gangrene of the limb, the operation is indispensably necessary, and to be performed in the following manner.

SUPPOSING the patient seated, and the arm held fast, as was directed for the true aneurism; I apply the *tourniquet* in the same manner to prevent an effusion of blood during the operation. This done, I make an incision in the skin, at the place of bleeding, according to the direction of the artery. The extent of the tumor, which is discoverable by the clots of extravasated blood, must determine the length of this incision; for if they are considerable, they must be taken out, in order to which we must allow ourselves room by sufficiently dilating the *aponeurosis* of the *biceps*. I then open the *capsula*, to discover the orifice in the artery, and if any coagulated blood is found within the *capsula*, I take it out. This done, having soaked up all the blood with a spunge, I loosen the *tourniquet*, to take a better view of the orifice in the artery, tightening it again immediately.

WE might avoid tying the ligature upon the artery, by making a compression directly upon the orifice, that is, by applying a piece of paper

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wetted and squeezed out, supported by graduated compresses and a bandage. Thus, in many cases where an artery is opened, a fixed compression proves sufficient till the orifice is closed; but this method is not so certain as the ligature. If therefore the compression cannot be securely made, I pass the needle invented by Monf. *Petit*, which carries two pieces of strong waxed thread, underneath the aperture of the artery, and having placed one of the threads above the opening, and the other below it, I tie them, beginning with the superior. For want of this needle we may use a common one, made blunt at the point, but the former is most convenient. I then loosen the *tourniquet* a little, to see if the ligatures are well made; and if the blood still comes out, we must renew the ligature which we find defective: if the blood flows immediately upoon loosening the *tourniquet*, it shews the ligature above the orifice is in fault; but if the blood does not appear till some time after, the inferior ligature is improperly made.

Some practitioners do not give themselves the trouble to lay the artery bare; but as soon as they have discovered the *capsula*, they pass a threaded needle deep underneath, inclosing at once the *capsula*, and as much flesh as they can with it, and then fasten the ligatures in the same manner as has been just directed. Now, though by this method they tie the nerve which is within the *capsula* together with the artery, yet it is very seldom any ill consequences ensue from thence, as the quantity of flesh included by the ligature prevents the nerve from being very much compressed.

The ligatures being made, I lay a small roll of linen or paper, about a quarter of an inch in diameter,

diameter, croſs the artery, a little above the upper ligature; which roll we keep on by ſeveral graduated compreſſes, and fill up the reſt of the wound with lint. This little roll, by preſſing upon the artery, prevents the impulſe of the blood againſt the ſuperior ligature, that might otherwiſe perhaps make it ſlip. The whole is to be preſerved in its place by a moderate bandage, and the arm kept in a flexed poſition.

Of whatever kind the aneuriſm be, and whether cured by compreſſion or an operation, it can be effected only by preventing the paſſage of the blood through the artery. It will be neceſſary therefore that the office of this artery ſhould be ſupplied by ſome other. There is often a conſiderable branch in the right arm which proceeds from the trunk of the *brachialis* three fingers breadth below the arm-pit, and this branch ſupplies the defect of the trunk: if there is no ſuch branch, the blood which paſſed through the trunk of the affected artery, muſt make its way through the ſmall collateral veſſels by gradually diſtending them. We ſhould take care therefore to avoid doing any thing which may diſturb this intention of nature, and on the contrary rather endeavour to aſſiſt her. For this reaſon the bandage ſhould be applied eaſily, ſince if drawn tight it would obſtruct the paſſage of the blood both in the veins and arteries. It is with the ſame view I omit the uſe of the thick compreſs propoſed by authors to be laid along the artery above the aneuriſm, as it could not be kept on without a roller, which would in ſome degree obſtruct the courſe of the fluids. The ſmall roll laid acroſs the body of the artery, above the ſuperior ligature, ſerves ſuffi-

ciently, and better than this compreſſion, to reſiſt the impulſe of the blood that deſcends through the arterial trunk, and does not obſtruct its return by the veins, as the bandage would.

It is adviſed to place the limb a little raiſed after the operation, in order to facilitate the return of the blood; but in this caſe the difficulty does not lie in the return of the blood, but in its paſſage through the ſmall arteries. We muſt deviate therefore from this rule, and in order to aſſiſt nature, already under great difficulty to ſend the blood to the extremity of the limb, we muſt place the hand ſomewhat lower than the elbow. Further, as heat diſtends the veſſels, and as brandy by its ſpirituous parts may not only procure the reſolution of the extravaſated or tranſuded fluids, but may alſo accelerate the courſe of others which circulate too ſlowly, it would be proper to cover the whole arm and fore-arm with compreſſes dipt in hot brandy, and frequently moiſtened with the ſame. Two hours after the operation the patient ſhould be blooded, to prevent a fever and inflammation.

To conclude, we ſhould frequently examine the arm, to ſee if the part below the ligature is not in danger of a gangrene for want of the blood's circulating through it. We may diſcover whether the collateral branches begin to perform the office of the trunk, and the blood begins to circulate to the extremities, by the beating of the pulſe and the heat of the limb.

The firſt dreſſings may be left on two or three days; and in removing them, we muſt be careful to find out the ends of the threads belonging to the ligatures, that we may avoid pulling them. To

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prevent likewise removing the pressure placed upon the artery above the superior ligature, we must keep a finger upon it whilst the rest of the lint is taken away; because that part of the dressings should remain on till it falls off by the suppuration.

LASTLY, lest the joint of the elbow, by being too long confined in one position, should lose the freedom of its motion, it would be proper, when the wound is in a fair way of healing, to extend and bend the arm alternately, without suffering the patient to contribute at all to these motions himself. As to the motions of pronation and supination, those he may be permitted to use, provided he does not exert any force in so doing.

OF THE

PANARIS or WHITLOE.

ANY collection of *pus* formed in the fingers is termed by authors *panaris* or whitloe, and is an abscess of the same nature with those arising in other parts of the body. These abscesses are situated more or less deep, which has induced the writers upon this subject to divide them into several species; accordingly they have ranged them under four heads, agreeable to the places where they are formed. The first kind of *panaris* is formed under the cuticle on one side of the nail, and sometimes all round it. The second is seated in the fat lying under the skin between that and the sheath which involves the flexor tendons. The third is described by authors to be formed within the

the ſheath; and they ſtill add a fourth ſpecies, ariſing between the *perioſteum* and the bone.

The firſt ſpecies of Panaris.

This ſeems to be only a diſeaſe of the ſkin, which being ſlightly excoriated or irritated from ſome external cauſe, as a blow, puncture, &c. inflames and is followed by a collection of a purulent *ſerum* between the cuticle and true ſkin, which ſeparates the cuticle firſt in one part only, and afterwards all round the nail. This produces a ſort of tranſparent bladder, like that which generally appears after a burn. This bladder extends itſelf by little and little, and if it ſpreads to the root of the nail it ſeparates it from the fleſh, by matter formed underneath.

Signs. This ſpecies of *panaris* is eaſily known. It begins by a ſlight inflammation round the nail, with a throbbing, and by degrees raiſes up a ſmall white bladder.

Cure. This diſorder is as eaſily cured as known. As ſoon as the bladder is formed it muſt be opened, and part of the cuticle, which forms it, ſhould be ſnipt off with the ſciſſars; otherwiſe the bladder ſometimes ſpreads round the nail. After the bladder is opened, a pledget of cerate, a rag dipt in wine or brandy, in ſhort, any deſiccative application will ſerve for the firſt dreſſing. Next day the reſt of the cuticle that is ſeparated from the ſkin, ſhould likewiſe be cut off, and a new one is generally found underneath; if not, there ſoon will be one, and the diſeaſe is quickly cured. But if the inflammation has been ſo conſiderable as to form matter at the root of the nail, the ulcer is more difficult to cure, for the nail being looſened

loosened becomes an extraneous body in the sore and prevents it from cicatrizing. In this case the nail must be cut away as it loosens, and some lint put between that and the suppurating flesh, in order to defend the latter from the nail. The ulcer can never heal whilst this last particular is neglected; but with these precautions and the assistance of proper applications, it will soon do well.

The second kind of Panaris.

The second sort of *panaris*, which is formed between the skin and the sheath of the flexor tendons, is a *phlegmon*, and of the same nature with those happening in other parts.

Causes. This, like other phlegmons, may proceed from an internal cause, but it is generally owing to an external accident, as a puncture, excoriation, contusion, &c. The skin and fat being irritated or punctured, become inflamed, and the inflammation spreading to the rest of the fat, the whole finger swells. This inflammation may extend to the fat and cellular substance that invests the tendon of the *musculi interossei* as far as their origin, or produce sinuses quite into the substance, as well as over the surface of the hand. In this case, the symptoms are in proportion to the degree of the inflammation and the nature of the parts affected. They are more acute than in other phlegmons for the following reason: the skin of the finger is of a firm close texture, and therefore cannot give way to the increased size of inflamed parts which it incloses; consequently the tension, pain, and fever must be so much the more violent.

Signs.

SIGNS. The nature of the ſymptoms incident to this ſpecies of *panaris* being the ſame with thoſe of other phlegmons, it is needleſs to be more particular about them.

PROGNOSTIC. We muſt form our prognoſtic from the degree of the inflammation and the ſymptoms. If the inflammation is ſlight, we may hope to abate it by the aſſiſtance of art, but if the inflammation and the other ſymptoms are conſiderable, the diſeaſe is ſeldom cured but by ſuppuration; that is, an abſceſs will enſue.

CURE. From whatever cauſe this kind of *panaris* proceeds, it muſt be treated like other phlegmons; that is, we muſt endeavour to abate the inflammation by bleeding, a proper regimen, and the application of emollient and reſolvent cataplaſms upon the part inflamed. If by this method we do not intirely remove the inflammation, we ſhall at leaſt abate it in ſome meaſure, and conſequently the pain, fever, and other ſymptoms will be leſs violent. Theſe remedies however will not always prevent a ſuppuration, but if there ſhould be any matter forming it will ſoon be perceptible; for though the ſize of the finger is conſiderably enlarged by the ſwelling, yet upon examination one may diſtinguiſh a ſort of circumſcribed tumor at the place where the *pus* is collecting; and this is exactly the part where the finger had been pricked, excoriated, or bruiſed. In this caſe, the cataplaſms muſt be changed, and maturatives ſubſtituted for emollients till the *pus* is formed, which it probably will be in the ſpace of twenty-four hours. As ſoon as ever the matter is formed, an opening muſt be made, for by delaying this too long, the *pus* diſſolves all the fat, and occaſions ſuch a conſiderable loſs of ſubſtance in

in the finger, especially in mechanics whose skin and cuticle are very thick, that, the *capsulæ* of the articulations and the *periosteum* being putrefied either the articulations will be found separated by the *pus*, or the bone laid bare in the middle.

In order to make the opening, the hand is to be held fast by an assistant, and placed in such a manner that the elbow may be fixed against something firm: for if the patient is prevented from moving back his elbow it will not be in his power to draw away his hand. It is oftentimes difficult to feel the *pus* fluctuate, as the quantity of it is not always answerable to the size of the finger; but the small circumscribed tumor before-mentioned, and the account the patient gives, who points out the place where he was hurt, and where he felt the first pain, will indicate the situation of the matter, which is generally seated near the sheath. To proceed then, I pass in the point of a straight bistory to the *pus*, and lay open the whole length of the swelling, taking care not to leave any *sinus* at the extremities of the incision; for which reason if I discover any matter passing out from thence, I introduce a director, and with my knife or scissars dilate them.

But notwithstanding this incision will serve to let out the matter, yet the dressings cannot be applied without difficulty and pain, unless we take off one if not both the lips of the wound; after which it should be dressed with dry lint and a proper bandage.

It sometimes happens that the opening is delayed too long, and the matter piercing the skin, the serous part of it lodges itself under the cuticle, and separates it from the skin almost all round the finger. Upon opening this swelling, which is almost

moſt tranſparent, and attended with a very plain fluctuation, we find that we have only opened the cuticle, which comes off almoſt entirely. As ſoon as the cuticle is removed, we diſcover a ſmall hole in the ſkin, from whence the *pus* iſſues. Into this orifice we paſs a director, and with the biſtory dilate the aperture upwards and downwards, and afterwards take off the lips of the wound in order to the eaſier application of the dreſſings. It is more neceſſary to obſerve this laſt circumſtance of taking off the lips, as in this caſe the ſheath generally ſuppurates and comes away in a ſlough. If only the outſide of the ſheath ſloughs, the flexion of the finger may be preſerved after the cure; but if the whole ſubſtance of it putrefies and comes off, the flexor tendon being left bare will ſuppurate, and ſometimes come entirely away; in which caſe the flexion of the fingers is deſtroyed.

WHETHER the *panaris* is opened in time, or, as in the laſt caſe, too late, the wound muſt be dreſſed as a common wound, with this difference only, that when the ſuppuration is eſtabliſhed, the aponeurotic or tendinous parts of the ſore ſhould be touched with *ſpir. Tereb.* or *balſ. vir.* till they are digeſted off.

IN caſes where the ſheath has ſuppurated, or where it has come away intirely putrefied, the inflammation generally extends either into the ſubſtance of the hand, or upon the ſurface of it to the fat that covers the muſcles, whoſe tendons have ſuffered; and in conſequence of this inflammation abſceſſes may ariſe there, which muſt be opened and dreſſed according to art.

The third kind of Panaris.

THE third kind of *panaris*, as deſcribed by authors, is formed within the ſheath of the tendon. But though the authors who have treated this diſorder agree in the uſe of this expreſſion, yet, in my opinion, it gives an improper idea of it, and therefore ought to be rejected. I know of nothing within the ſheath but the tendon. Do they imagine that is impoſthumated? It is no more liable to do ſo than the other tendons in general. To clear up this affair then, I alledge, that *pus* is not always the effect of a *phlegmon*, but oftentimes of an *eryſipelas*, which having affected ſome membranous or aponeurotic part, could not be terminated by reſolution. In which caſe we know, that the aponeurotic or membranous part, that was affected, putrifies and produces a different ſort of matter from what is found in phlegmonous abſceſſes. If then a *panaris* of the third ſpecies is formed, it is not, like the ſecond kind before deſcribed, a phlegmonous abſceſs, but a putrefaction either of the ſheath alone, or the tendon with it.

CAUSES. I do not think that an *eryſipelas* affecting theſe parts and forming a *panaris*, can proceed from an internal cauſe, ſince we don't find that the other tendons are ſubject to this diſorder; but it may be owing to a puncture, which has affected the tendon together with the ſheath, or even the ſheath only. Theſe two parts we know are blended together at the third joint, where the tendon is inſerted into the bone; it is no wonder therefore if an inflammation of the one ſhould extend to the other. The inflammation ſpreads afterwards all over the hand, and along the muſcle from

from which the tendon ariſes, as far as to the fore-arm, ſometimes even to the whole arm, forming an eryſipelatous inflation, which terminates under the arm-pit, and ſwells the axillary glands. The pain and fever are then very violent, attended ſometimes with a *delirium* and convulſions.

Prognostic. By this account of the ſymptoms, it is reaſonable to infer that no good prognoſtic can be formed of the diſeaſe. We may pronounce therefore in ſuch a caſe, that the patient is in great danger of loſing the free uſe of his finger, if not the finger itſelf. Nay, it has happened, that by neglecting this diſorder at the beginning, it has coſt the patient the loſs of his arm, and even of life.

Cure. The inflammation which attends this diſorder ſeldom terminates by reſolution, nevertheleſs this is the firſt intention we muſt endeavour to anſwer: and in order to effect this if poſſible, we muſt enjoin the patient a very ſtrict diet, and bleed him ſeveral times in the other arm, applying alſo emollient cataplaſms to the part affected. If, notwithſtanding theſe precautions, we find the diſorder increaſes, we may be aſſured that the ſheath, and even the tendon itſelf are beginning to putrefy; and that a ſuppuration is on the point of being formed in all the adipoſe parts that cover the ſheath. Muſt we then, as in phlegmons that are ſeated in the *membrana adipoſa*, haſten the ſuppuration by the uſe of maturating cataplaſms, and wait till the *pus* is formed? Certainly not, for if we wait for this, we ſhall find that when the *pus* is formed, both the ſheath and the tendon, together with the *capſulæ* of one or more of the joints, will be putrefied. In which

caſe the patient muſt neceſſarily loſe ſome of th phalanges, if not the whole finger. To prevent this therefore, we muſt perform the operation before the maturation is completed, by laying open the fore-part of the finger and the ſheath itſelf down to the tendon, at the place where the pain was firſt felt. The inciſion ſhould be ſufficiently large, and the bridles formed at the joints by the ſheath, which render it of a cloſer texture in thoſe parts, ſhould be exactly divided. We ſhould alſo cut off the lips of the wound, as was before directed, for the more convenient and eaſy application of the dreſſings.

THE opening being made, we muſt ſtill endeavour to remove the inflammation by bleeding and reſolvent cataplaſms, till the ſymptoms diſappear and the ſuppuration is eſtabliſhed.

THE patient in this caſe will neceſſarily loſe the flexion of the finger, but this is a misfortune proceeding merely from the diſeaſe, and not from the operation. Whilſt the wound is healing, the ſurgeon ſhould take care to keep the finger bent, that it may remain in the moſt uſeful poſition.

The fourth kind of panaris.

THE fourth kind of *panaris* is ſaid to be formed between the *perioſteum* and the bone; but as there is no intervening ſubſtance between theſe, I muſt obſerve again, as I did in the definition of the preceding kind, that this expreſſion does not convey a juſt idea of the diſorder. We may with much more reaſon aſſert that this ſpecies of *panaris* proceeds from a diſeaſe of the bone, in conſequence of which the *perioſteum* ſoon putrefies, or is attacked with an *eryſipelas*, which degenerates into

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a putrefaction: from whence it happens that, upon making an opening, the bone is found bare, and frequently carious.

Signs. This sort of *panaris* begins with an acute pain, which gradually increases as the disease of the *periosteum* spreads to the sheath, and the adipous parts that cover it; and as these parts become inflamed successively, the pain and fever increase proportionably; but the inflammation seldom extends over the fore-arm, as it is described to do in the preceding kind.

Prognostic. As the bone is affected in this case, there is great reason to apprehend the loss of the *phalanx* that is laid bare.

Cure. We can only propose the same method here as was before directed to moderate the violence of the symptoms till the *pus* is formed, and till the opening can be made where the matter is easiest felt; for we must not treat this as we do the third species of *panaris*, by making an incision into it before the maturation is completed. It is impossible to determine, till we have made the opening, whether the patient will lose the *phalanx* or not: If the disease began at the bone, he certainly will; for in this case we find the bone carious, and generally separated from the next *phalanx*, the *capsula* of the joint being putrefied as well as the *periosteum*. But if the disorder began at the *periosteum*, it is possible the bone may be bare only in one particular part, in which case the *phalanx* may be preserved; but this is very seldom the case, the bone being commonly bare all round. We are to judge by the different circumstances, whether it would be proper to amputate this *phalanx*. If the bone is almost entirely separated, we must complete the separation

quite round, and take it out: this indeed is attended with ſome pain; but we thereby preſerve the end of the finger, which is eaſily cured afterwards, and the finger being left thus leſs unſightly, the patient will be better ſatisfied. If the bone is bare but in one particular part, we need only cut off the lips of the inciſion, as was before directed, and the bone will exfoliate imperceptibly, unleſs the *caries* penetrates through the ſubſtance of it; in which caſe the bone gradually dries away, the *perioſteum* putrefying all round it, and in a little time may be eaſily taken out, and the wound ſoon healed.

As to the dreſſings, they have nothing particular in them from thoſe of other wounds.

OF THE

Amputation of Limbs in general.

A Free and perfect uſe of the limbs is a circumſtance of that conſequence that no means ſhould be left untried for their cure, and to preſerve their natural functions, ſo as to make them as uſeful as before they became diſeaſed. This indeed we cannot always ſucceed in, being obliged, on ſeveral occaſions, to proceed to amputation: thus a *caries*, or bad fractures of the bones, mortifications, and many other diſorders, may make this operation neceſſary: but as it would be improper in this place to enter into a particular account of theſe diſeaſes, I ſhall at preſent only deſcribe the manner in which the different kinds of amputations are to be performed.

AND

And firſt, an amputation ought always to be made in the ſound part of a limb, as it may otherwiſe prove of no ſervice. Secondly, a limb may be cut off in the ſpace between one joint and another, or it may be taken off at the joint itſelf. If we have no particular reaſon to do it in one part rather than another, it is better to chuſe any place rather than the joints, becauſe the other parts are provided with fleſh capable of yielding a good digeſtion; whereas the joints, being ſurrounded with hardly any thing but *aponeuroſes*, ligaments, and tendons, ſcarce ever ſuppurate laudably. If we ever amputate at the joints, it ſhould be for one of the following reaſons; firſt, where there is no convenient ſpace above the diſeaſed limb, as when the *humerus* is taken off at the ſhoulder; ſecondly, to preſerve a greater portion of the limb, as when a finger is cut off at the articulation of the laſt phalanx with the ſecond.

When an amputation is performed upon one of the ſuperior extremities, it ſhould be done as low as poſſible, that the remainder of the limb may be uſeful; and the ſame rule holds in the amputation of the thigh, and likewiſe thoſe made in the foot. As to the amputation of the leg, if we were to obſerve this method there, the length of the ſtump would be rather troubleſome than uſeful, and therefore only ſo much ſhould be left as is neceſſary to make a convenient reſt upon the wooden leg. This will be about three or four fingers breadth below the tuberoſity of the ſuperior and anterior part of the *tibia*.

These are the general rules; but in regard to each particular amputation, it may be thought neceſſary perhaps in ſome reſpects to deviate from them.

Of the amputation of the arm, the fore-arm, thigh, or leg.

Supposing we are to take off the arm, fore-arm, thigh, or leg; after having got ready the inſtruments and dreſſings, the patient ſhould be placed in a convenient ſituation both for himſelf and the operator, and the aſſiſtants properly diſpoſed in order to execute their parts.

If the arm or thigh are to be taken off, I place myſelf on the outſide of the limb; if the fore-arm or leg, I ſtand on the inſide, in order more conveniently to ſaw both the bones at the ſame time.

I then order the limb to be ſupported by two aſſiſtants, one of them holding the upper, the other the lower part of it. If the bone is ſplintered, the leaſt motion of the limb would be liable to give violent pain; the aſſiſtant therefore who holds the lower part of the limb ſhould keep it ſteady by placing it upon ſomething ſmooth and even, as the end of a board covered with a pillow; or if it is a compound fracture, the limb ſhould be kept in the fracture-box.

The limb being properly ſupported and kept ſteady, I begin by applying a ligature drawn tight with a *tourniquet*, to ſecure the hæmorrhage; and in order that the ligature may preſs every where equally, it ſhould be placed upon a part where there is only one bone, as the arm, or thigh: this is particularly neceſſary for the two following reaſons; firſt, ſuppoſing we are to amputate the fore-arm immediately above the wriſt, and we fixed the ligature below the elbow, the artery that runs

runs between the two bones would not be compressed, but an hæmorrhage would ensue notwithstanding the ligature; secondly, as soon as the bones were divided, the ligature would press together the extremities of them, so that they would conceal the artery that runs between them. The most usual manner of applying this ligature, is to put a bolster upon the vessels, and to retain it there by a circular compress; then to apply a fillet upon that, which, after going twice round, is drawn tight by a *tourniquet* placed directly opposite to the bolster; in order to tighten this *tourniquet* with ease, I put a pasteboard between that and the circular compress, and deliver it to the care of the assistant who supports the upper part of the limbs; or we may use the *tourniquet* with screws, invented by Monf. *Petit*. Both these *tourniquets* have their advantages and inconveniences. Monf. *Petit's tourniquet* with screws, compresses the trunk of the vessels, but makes very little pressure any where else. For which reason, if there should be any large collateral vessel, it might bleed very considerably before the hæmorrhage could be stopt, as that could not be done till after the amputation. On the other hand, his *tourniquet* has this advantage, that, for want of a skilful assistant, the operator himself may loosen or tighten it occasionally; and upon this account it is particularly useful in the army, where many people being wounded together, some may continue bleeding and perish by the hæmorrhage for want of timely relief. Now by the application of such a ligature to each of them the hæmorrhage will be secured till they can be regularly dressed. The other sort of ligature is also liable to an inconvenience, viz. occasioning a contusion round the

the limb where it is applied; but that may be prevented by firſt putting on a roller of a ſufficient breadth. Beſides, the patient derives ſome advantage by its numbing the limb, and thereby rendering the pain of the inciſion leſs ſenſible, to which the *tourniquet* with ſcrews does not contribute.

Whatever ligature we fix upon, after it is applied and made ſufficiently tight, the fleſh is to be drawn as much as poſſible towards the upper joint, and with the ſame view (that is, to preſerve as much of the ſkin and muſcles as we can, in order that the bone may be ſooner covered, and the cicatrix ſooner formed) we make the inciſion of the fleſh at twice. Having received the knife (which is generally crooked, though a ſtraight one would likewiſe anſwer the purpoſe) from an aſſiſtant, I carry it underneath the limb, and I divide the ſkin and half through the muſcles at one ſtroke, by a circular inciſion made two fingers breadth below the place where we intend to ſaw the bones. Immediately after this, I order the ſkin and muſcles to be drawn as high as poſſible, and I make a ſecond circular inciſion exactly at the edge of the retracted ſkin. By this means we avoid cutting any more of the ſkin, and divide only the muſcles and through the *perioſteum*. I then lay aſide the large knife, and take a ſtraight biſtory, with which I divide any remaining fleſh that may have eſcaped the other inciſion. This biſtory is chiefly uſeful in the amputation of the fore-arm or leg, for the parts between the two bones are certainly miſſed by the large knife, whereas the biſtory ſerves to divide them exactly. The muſcles and *perioſteum* being thus all divided, this laſt inciſion deſtroys all communication of life between that

part

part of the *perioſteum* above the inciſion, and that which is below; conſequently, as no ſenſation remains there, it is needleſs to ſcrape the bone, in order, as authors have propoſed, to ſeparate the *perioſteum*. This would not only prolong the operation, but it is impoſſible to ſcrape exactly round the two bones of the leg and fore-arm: to which we may further add, that the ſmall part of the *perioſteum*, which is not ſcraped, is not at all capable of clogging the teeth of the ſaw.

Supposing the aſſiſtant who is entruſted with the care of the lower part of the limb, holds it upon the end of a board, or in the fracture-box, as was before directed for a compound fracture requiring amputation, this aſſiſtant, as ſoon as the fleſh is divided, ſhould hold and fix the end of the bone ſo that it may not ſhake under the ſaw. And this he may do the more readily, ſince the lower part of the leg requires now no particular care, as it is void of ſenſation. I then take the ſaw, and caſting an eye upon the blade to ſee that it is properly fixed, I apply it to the bone, and moving it gently, make the firſt impreſſion. I afterwards proceed with more force and make greater ſtrokes, but ſtill without bearing too hard, and when the bone is almoſt divided, I again move it gently to prevent ſplintering the bone. If there are two bones, as in the fore-arm and leg, I apply the ſaw to the largeſt, and make the firſt impreſſion there; this done, I proceed, and ſaw both the bones together, taking care to go quite through the ſmall bone before the other is entirely divided. I then looſen the *tourniquet* to find the ſituation of the blood veſſels, and having diſcovered them, I tighten it again.

The

The hæmorrhage may be ſtopt by different methods, as First, by the application of a button of vitriol to the veſſel; Secondly, by applying a button of allum; Thirdly, by a ligature: Each of which has its advantages and inconveniences. The button of vitriol ſupported by compreſſion is a good way: the vitriol diſſolving gradually, cauterizes the veſſel and the fleſh to a certain height, and the blood coagulating in the veſſel above the part cauterized, the eſchar ſupports the clotted blood, and ſtops the hæmorrhage till the eſchar falls off by ſuppuration. This method however is not without inconvenience; for if the button of vitriol be too large, the eſchar extends farther than we would have it, cauterizing a great deal of the fleſh, and ſometimes the ſurface of the bone. To prevent this accident, the button ſhould be very ſmall and well ſupported. The button of allum, ſupported likewiſe by compreſſion, ſerves equally well to reſtrain the hæmorrhage, by cloſing the mouth of the veſſel, where a clot is formed, which ſtops the aperture in the artery; but as it produces no eſchar, there is always room to fear that the clot, having nothing to keep it up, may come away, and conſequently a hæmorrhage enſue. Tying the veſſel then is the moſt ſecure way; though that too is attended with an inconvenience, it being very difficult to avoid tying the nerve that accompanies the artery, which after a few days ſometimes brings on convulſions that make it neceſſary to cut the ligature.

However, though each of theſe methods have their inconvenience, yet we are obliged to make uſe of one of them; and herein we muſt be determined according as different circumſtances appear

to

to make either of them preferable. When a patient is properly accommodated, and can be kept quiet, the button may be applied, as we may thereby secure the hæmorrhage without running the hazard of convulsions; but if the patient must be moved after the amputation, it will be proper to use the ligature as being the most secure means, and especially as the convulsions, if they do ensue, do not appear till some days after the operation. There is however a method by which the blood may be stopt in each of these cases without running the risque of any of the inconveniences before-mentioned: for which purpose we must make use of the ligature and a small button of vitriol at the same time. By the ligature we easily stop the blood, and by a small button of vitriol, which forms its eschar gradually, and produces it exactly upon the vessels to which it is applied, the ligature is included and at last becomes useless. As the convulsions seldom come on till some days after the operation, the button of vitriol need not be applied upon the ligature till the first dressings are removed. In order to make the ligature, I take a crooked blunt-pointed needle armed with two or three threads waxed together, and pass it round the vessel, taking flesh enough with it to prevent the threads from cutting through. I then tye the two ends of the threads together with a double knot, and make a single one over that. If several vessels bleed together, they must be tied one after another, unless they can all be included within the same ligature. This done, the *tourniquet* is to be loosened entirely, and the ends of the threads should be left long enough to be brought over the stump, that they may be distinguished from the lint which is to cover the

wound.

wound. I then apply a ſmall pledget of dry lint to the ends of the bones, covering the reſt of the ſtump with ſoft pledgets either of lint alone or ſtrewed with colophony.

In order to keep the ſkin even with the fleſh, or rather that it may in ſome meaſure cover it if poſſible, we apply two ſtraps of plaſter over the lint proportionable to the ſize of the ſtump. Theſe ſtraps laid croſſways upon the lint have four ends, which adhering to the ſkin prevents its retracting towards the upper joint. We then cover the whole with a crucial compreſs, two longitudinal compreſſes applied crucially, and another paſſed round the ſtump, with a roller of a ſufficient length to make five or ſix turns only, and not applied tight. Over all theſe we draw on a cap of a ſuitable ſize, and faſten it at the upper part of the limb with two pieces of tape.

The patient being put in his bed, and the ſtump placed in a proper ſituation, we leave an aſſiſtant with him for ſome hours, who keeps his hand preſſing lightly upon the dreſſings, either to ſupport the ligature, or to retain the ſtyptic till the eſchars are formed. I forbear giving directions about the regimen, as well as the uſe of bleeding and other remedies, which the operator's judgment will direct him in according as the different ſymptoms require.

The amputation being finiſhed in this manner, the ſtump is generally two or three months in healing, according to the ſize of the limb, and the care that has been taken to keep the ſkin (which always inclines to recede) from being drawn upwards. It is for this reaſon that ſome ſurgeons have propoſed to amputate with a flap; but of all the different ways that have been adviſed, that which

which ſeems preferable, in my opinion, is the amputation with two flaps. Monſ. *Ravaton*, chief aſſiſtant ſurgeon at the Royal Hoſpital of *Landau*, was the firſt who propoſed this method, and by the account he tranſmitted to me, it appeared to be of excellent uſe in practice. This induced me to try it, which I did with ſucceſs, the patient being entirely cured in three weeks. After this Monſ. *Vermale*, ſurgeon to his ſerene highneſs the Elector Palatine, having conſidered the advantages of this method, as practiſed by Monſ. *Ravaton* and myſelf, introduced another way of doing it, which he likewiſe communicated to me. I ſhall give a deſcription of both, and leave the reader to compare them.

Of the amputation with two flaps according to Monſ. Ravaton's *method.*

We will ſuppoſe the thigh is to be amputated: in which caſe directing it to be ſupported by two aſſiſtants, I apply the *tourniquet* on the upper part, to ſecure the hæmorrhage in the manner as was before deſcribed. I then order the ſkin to be drawn up as much as poſſible, and make a circular inciſion, two, three, or four fingers breadth below the place where I intend to ſaw the bone. The larger the limb is, the lower this inciſion muſt be made, in order that the ſkin and fleſh of the two flaps may be brought exactly together after the operation, without being too much extended. The aſſiſtant, who holds the upper part of the limb, pulls up the ſkin again, and I make another circular inciſion even with the edge of the ſkin, quite to the bone. Thus by the firſt inciſion I cut through the ſkin only, by the ſecond I divide the

the muſcles. I then paſs the point of a ſtraight biſtory in the forepart of the limb directly down to the bone, and exactly at the place where I intend to ſaw, and I make a longitudinal inciſion in the fleſh, continuing it down ſo as to make it terminate at the circular inciſion. This done, I make a ſecond longitudinal inciſion in the poſterior part of the limb anſwering to the firſt, taking care in both theſe inciſions to avoid cutting any large blood veſſel; upon which account in the fore-arm, where there are two bones, one inciſion muſt be carried along the *ulna*, the other along the *radius*; in the leg they are to be made one along the outſide of the *tibia*, the other on the poſterior part of the *fibula*. Having proceeded thus far, I raiſe up the two flaps, which are eaſily ſeparated; or if there is any part which adheres more ſtrongly, I divide it with a biſtory, and afterwards keep up and ſecure the flaps with a ſlit compreſs. Immediately, with a ſmall crooked biſtory, I make a circular inciſion upon the bone at the place that is to be ſawed, dividing very exactly the ſmall remainder of fleſh, and with it the *perioſteum*, and then ſaw the bone (it would be proper to have the blade of the ſaw very narrow). If any ſmall ſplinters remain at the end of the bone, I take them off with the inciſive pincers. When the bone is divided, I order the *tourniquet* to be looſened a little, and tye the veſſels as near as poſſible to the edge of the ſkin, letting the threads of the ligature paſs through the longitudinal inciſion made in the hind part of the limb. I then wipe the whole circumference of the ſtump clean, and bring the two flaps, eſpecially the ſkin of them, exactly together, and ſecure them by ſlips of linen ſpread with ſticking-plaſter;

ſter; taking care however that the lips of the poſterior inciſion remain unclosed. Theſe plaſters ſhould be about an inch broad, and long enough effectually to ſupport the ſkin. I likewiſe paſs another ſlip round the ſtump directly below the place where the bone is cut off, in order to bring together and ſuſtain thoſe parts of the flaps that are to adhere to the extremity of the bone.

The dreſſings are as follow: Firſt, a very thick pledget, forming a ſort of quilt or cuſhion, which covers the end of the ſtump. Secondly, two ſquare compreſſes pretty thick, and laid upon the ſides of the flaps to keep them preſſed one againſt the other. Thirdly, a crucial compreſs. Fourthly, the whole ſupported by five or ſix turns of a roller drawn moderately tight, and applied in ſuch a manner as not to bring together the lips of the poſterior inciſion through which the ends of the ligatures paſs. Laſtly, over all, we draw on a woolen cap, which preſerves the warmth of the ſtump.

Monſ. Vermale's *method of amputating with two flaps.*

The ligature being applied as uſual to ſecure the hæmorrhage, I order two aſſiſtants to ſupport the limb, which we will ſuppoſe to be the right thigh. This done, I take a very ſharp ſtraight biſtory, between ſeven and eight inches long, and about half an inch broad, and turning the back of it towards the upper part of the thigh, I paſs the point perpendicularly through the teguments and muſcles in the fore-part of the limb quite down to the bone, and exactly at the place where I intend to ſaw. I then carry the

point by the ſide and round the bone as far as the hind part, and there piercing through the muſcles and the ſkin, I puſh the point out at the hind part of the thigh. I afterwards paſs the edge of the biſtory by the ſide of the bone, cutting downwards about the length of half an inch, more or leſs, according to the ſize of the limb; then turning it a little from within outwards, I divide the muſcles and ſkin obliquely, making on this ſide a flap of a conic figure. The length of this flap muſt be determined by the eye, and it is a circumſtance very neceſſary to be obſerved, to make it of a proper length, that it may exactly unite with the ſecond flap, which we are to make next. I then apply my biſtory to the fore-part of the bone at the ſame place as in making the former flap, and I finiſh the ſecond in the ſame manner and with the ſame precautions as I did the other. After this I raiſe up the two flaps, and ſecure them with a ſlit compreſs, which I deliver into the aſſiſtant's care who ſupports the upper part of the thigh. This done, with a ſmall crooked biſtory, I immediately divide the fleſh that remains round the bone, and likewiſe the *perioſteum*, by a circular inciſion made where the bone is to be divided, and I then ſaw off the bone as was before directed. If there are ſplinters or inequalities of the bone, they muſt be taken off with the inciſive pincers to prevent pricking the fleſh when the flaps are laid over it. The veſſels being tied as was before directed, I paſs the threads through the lower part of the inciſion, then bring the two flaps together, and keep them ſo by the ſame means as was recommended in the preceding method.

I HAVE

I HAVE already obſerved that the conic figure of the two flaps, the ſkin of which is ſomewhat longer than what is left of the muſcles, renders their union more eaſy and exact.

I HAVE frequently tried this operation upon dead bodies, not only in the thigh, but alſo on the leg, where it ſeems leſs practicable, becauſe the *tibia* is not inveſted with muſcles like the *femur*; and it appeared to me to be more readily executed than the method before deſcribed, and more convenient for the union of the two flaps. Both the one and the other are as ſoon performed as the common method which we deſcribed firſt; and when the amputation with two flaps can be practiſed, it is preferable to the common method, for the following reaſons:

1. THE flaps adhere to each other, and the fleſh unites with the bone, conſequently no exfoliation enſues.

2. THE cure is ſooner obtained, as no more of the wound remains than the longitudinal inciſion through which the threads of the ligature are paſſed.

3. BY this inciſion the nutritive juice which ouzes from ſuch parts as do not readily unite, gradually makes its way from the middle of the ſtump, and theſe parts unite inſenſibly; after which the remaining ſmall wound is not long before it heals.

4. THE fleſh and ſkin being brought and kept together by the ſtraps of plaſter, cannot recede towards the ſuperior joint, nor can the bone be left ſticking out, as has been often ſeen, by a waſting of the limb.

5. As the greateſt part of the wound heals very ſoon by this manner of performing the operation

we thereby avoid the violent ſuppurations which exhauſt the patient's ſtrength; likewiſe the *diarrhœas* that ſometimes proceed from their weak and low condition; alſo the reflux of purulent matter that might occur.

6. AFTER a cure performed in this manner the bone reſts as it were upon a cuſhion of fleſh, and the cicatrix is not apt, as in the common operation, to break out again. In ſhort, the cure is greatly forwarded, and ſuppoſing the bone cannot be covered again with the flaps, which may ſometimes prove difficult in the leg, yet at leaſt the wound is leſſened three fourths, and re-united in a few days, ſo that nothing but the exfoliation of the bone is wanting to complete the cure.

Of the amputation of the Arm at its articulation with the Scapula.

I OBSERVED before that it was better to amputate at the middle of a limb than in the joint. Firſt, becauſe the joints are ſeldom provided of fleſhy parts, ſo that it is difficult to procure a laudable ſuppuration there. Secondly, becauſe ſinuous abſceſſes are frequently formed along the tendons which extend to the bodies of the muſcles, and oblige us to repeat the operation. But the articulation of the *humerus* with the *ſcapula*, being inveſted with ſtrong muſcles, is different in this reſpect, and therefore the operation has been performed here with ſucceſs. Nevertheleſs, it ought not to be undertaken in this place, unleſs the upper part of the *humerus* is ſo diſeaſed as to make it neceſſary. My deceaſed father was the firſt who

performed this operation. See my *Obſervations* page 157.

THOSE who have either performed or written about this operation, obſerve as the firſt thing neceſſary, that ſufficient care be taken to ſecure the hæmorrhage; in order to which they make uſe of a large crooked needle armed with ſeveral pieces of ſtrong waxed thread; this they paſs three fingers breadth below the arm-pit, between the *humerus* and the veſſels running to the inſide of the arm; then laying a thick ſtraight compreſs upon the ſkin, they make the ligature, including therein the compreſs, ſkin, and veſſels. This being done and the arm amputated, they make a ſecond ligature under the arm-pit; but the firſt of theſe ligatures is very painful, greatly prolongs the operation, and, in my opinion, may ſafely be omitted; for by finiſhing the inciſion at the part where the veſſels are ſituated, we may immediately take hold of the end of the artery.

SUPPOSING this operation neceſſary and practicable, we ſeat the patient in a chair, the back of which is lower than the arm-pit; and in order to prevent his raiſing himſelf up, which, from the pain, he would be very apt to attempt, I paſs a cloth over his belly, and tie it behind the back of the chair; an aſſiſtant then holding the arm firm, with the elbow four fingers breadth from the body, I take a long biſtory, or inſtead of that a razor made faſt in its ſcale, and I make a tranſverſe inciſion through the greateſt portion of the deltoid muſcle at its upper part, and a little lower than where the *capſula* of the joint is connected to the *humerus*. This done, I immediately direct that part of the muſcle which is left, to be raiſed by an

aſſiſtant, and with a ſecond diviſion I divide part of the *capſula* tranſverſely, and likewiſe the tendon of the *muſculus ſupraſpinatus* which is inſerted there. After this, introducing my finger to diſcover the joint, I take another biſtory, fixed in its handle, and blunt, and I finiſh the inciſion of the *capſula*, cutting from within outwards, and at the ſame time divide the tendons that paſs over it, and alſo the tendon of the *latiſſimus dorſi*. Having proceeded thus far, I direct the aſſiſtant who ſupports the arm to puſh the *humerus* upwards and diſlocate it, which is eaſily done as it is now no longer confined by the *capſula*; then ſliding the edge of my knife between the head of the bone and the glenoid cavity, I finiſh the inciſion on the inſide of the arm, directing the edge of the biſtory between the bone and the veſſels as far as two or three fingers breadth below the arm-pit. There I finiſh the ſeparation of the fleſh, leaving only a ſmall flap of it in which the artery lies.

The arm being ſeparated, we diſcover the trunk of the artery from whence the blood proceeds, which I immediately take hold of with the fore-finger and thumb of my left-hand, and make a ſtrong ligature upon it under the arm-pit. If the flap is too long, I cut part of it off below the ligature, and if there be any other branch of an artery that bleeds, we likewiſe tye that.

The operation being finiſhed, I clean the circumference of the wound, and bringing the flaps together as near as poſſible, I ſecure them in that ſituation with ſtraps of ſticking-plaſter, in order to procure the re-union of the greateſt part of the fleſh. The glenoid cavity of the *capſula* ſhould be dreſſed

fed with dry lint, and in time it will produce new flesh, which will unite with the adjacent parts. The rest of the wound is likewise to be dressed with dry lint, and the whole kept on with a proper bandage, applying the same dressings afterwards as are usual in other amputations.

It may at first appear proper perhaps to leave flaps of a sufficient length to bring the lips of the wound exactly together, and procure a speedy re-union of them, as in the operation before described; but in this case that method is impracticable, for if the flesh was to cover the glenoid cavity it could not unite with it, as only parts that are recently divided can be re-united according to the first intention. For this reason therefore only so much of the flaps must be left on as is necessary to procure the re-union of the greatest part of the flesh which still bleeds, bringing them towards each other, and securing them in that situation as has been before directed.

Of the amputation of the Fingers.

The amputation of the fingers is never performed unless for one of the following reasons, viz. when they are gangrened; when the *capsula* of one of the joints is destroyed by putrefaction; when one or more of the phalanges are fractured with a considerable wound, as in those made by gunshot; or else when the bone is intirely rotten. Supposing it necessary to perform the amputation of the first phalanx, it may be taken off singly, and the others preserved.

These amputations may be made either at the joints or in the middle of the phalanx; but if there

 is

is the leaſt reaſon to ſuſpect that the joint is injured, we muſt in that caſe, purſuant to the eſtabliſhed rules before-mentioned, which direct us to preſerve as much of the limb as we can, but at the ſame time to cut only in the ſound part; we muſt then, I ſay, ſaw the bone above the joint, to preſerve at leaſt half of this phalanx.

As the veſſels are ſmall, there is no fear of any conſiderable hæmorrhage during the performance of theſe operations, conſequently there is no need to apply the *tourniquet*.

Before we proceed to the operation, the aſſiſtant who holds the hand, muſt ſecure it in ſuch a manner as to prevent its being moved; in order to which he ſhould place the patient's elbow againſt ſomething firm, which will hinder his drawing it back.

If we make the amputation in the middle of the phalanx, I take hold of the end of the finger, and by a circular inciſion cut through the fleſh to the bone, after which I divide the bone with a ſmall ſaw. Sometimes in theſe caſes we have an opportunity to make the double inciſion as in the leg or arm, in order to preſerve the greater ſhare of ſkin, and that the bone may be ſooner covered.

When we amputate at the articulations, we ſhould previouſly conſider the ſtructure of them, in order to avoid wounding the cartilage that covers the end of the ſound bone.

In amputating one of the two phalanges that are articulated by *Ginglimus*, we ought firſt to be well aſſured of the ſituation of the articulation. If the finger is not much ſwelled, we may diſcover this by bending the phalanx; but if the ſwelling is ſo conſiderable as to prevent this motion, we muſt judge

judge of it as near as we can, obſerving this caution however, to begin our firſt incision rather upon the bone that is to be amputated than upon the adjoining ſound bone, to avoid doing any injury to the latter.

The method of doing it is as follows. I take hold of the end of the finger and make a ſemicircular inciſion on one ſide of the joint, by this firſt ſtroke dividing the ſoft parts quite to the bone. I then thruſt the nail of my fore-finger into the inciſion, and examine for the joint, in caſe it is difficult to be diſcovered. Having found it, I divide a good part of the *capſula* of the articulation, inclining the edge of the biſtory rather towards the diſeaſed phalanx; and inſtantly I half luxate this phalanx, which is now very eaſily done, as the *capſula* no longer affords any reſiſtance; after which I complete the diviſion of the *capſula* together with the remaining fleſh.

If we are to amputate at the firſt phalanx, which is articulated by *Ginglimus*, with the metacarpal bone, we muſt bend the finger to diſcover the articulation; but if the diſorder will not permit this, the joints of the other fingers may ſerve to direct us, as they are almoſt parallel with each other. I then divide the ſkin on each ſide the finger with a ſtraight biſtory, as high up as the articulation, ſeparating in ſome meaſure this finger from thoſe on each ſide; which done, I divide part of the *capſula* of the articulation by a tranſverſe inciſion, made externally or internally, according as is moſt convenient. When we have proceeded thus far, we bend the finger and finiſh the amputation, taking care to divide the flexor tendons without ſtraining them.

As

As the cavity in the firſt phalanx moves upon the head of the metacarpal bone, which is round, we may be very liable to injure this with the biſtory, unleſs great care be taken to avoid it.

In whatever manner we perform the amputation of the fingers, whether it be in the middle of the phalanges or at any of their joints, there will be no occaſion to make a ligature upon the veſſels; the coagulated blood, which will be lodged in the dreſſings, being ſufficient to ſtop the hæmorrhage.

The dreſſings are a little lint, one or two crucial compreſſes, and a ſingle roller.

We cannot expect much diſcharge from theſe parts, as they are chiefly compoſed of bony and tendinous ſubſtances; and upon this account the dreſſings, by growing hard, would be liable to produce an inflammation there, and be attended with great pain; but, in order to prevent this, we ſhould moiſten them ſome hours after the operation with *ol. hyper.* and repeat this three or four times till the firſt dreſſings are removed, which ſhould not be attempted before the fourth day at ſooneſt.

The reſt of the dreſſings are the ſame with thoſe made uſe of in the amputation of a leg.

If the amputation is made in the joint, the cartilage at the end of the bone will be covered with fleſh in a few days without any viſible exfoliation; but if we amputate in the middle of a phalanx, we find the bone turn black ſoon after, and a ſenſible exfoliation muſt enſue. In order to promote this, the bone ſhould be touched two or three times with the *lapis infernalis*, and in four or five and twenty days the exfoliation will be made, and the cicatrix ſoon afterwards be formed.

If

If the inflammation ſpreads to the hand, it is poſſible, in the courſe of the dreſſings, that ſinuſes or abſceſſes may be formed along the finger or along the hand, either on the fore or back-part of it, this being an almoſt neceſſary conſequence of the inflammation that preceded the amputation. In which caſe they ſhould be opened without delay. See the article *Of Abſceſſes*.

Of the amputation of the bones of the metacarpus and metatarſus.

If there is a *caries* in one of the metacarpal or metatarſal bones, and no exfoliation can be procured, it will be neceſſary to ſaw off this bone; and it will be better to do this a little above the *caries* if we have room, than at its articulation with the carpal or tarſal bone; for as it is only united to them by very ſtrong ligaments, an eryſipelatous ſwelling would be the almoſt neceſſary conſequence of the operation if made in the joint. If we intend to ſaw off one of theſe bones, we muſt ſeparate the adjacent parts from it by a parallel inciſion made on each ſide as high as the place where we intend to ſaw. That being done, we divide the muſcles and tendons which lie upon the bone with a crooked biſtory; and in order to make this circular inciſion more conveniently, and to do it exactly at the angles of the two parallel inciſions, we introduce a director into theſe angles one after another, the groove of which ſerves to conduct the biſtory. We then take hold of that end of the bone which is articulated with the fingers, and with a very narrow ſaw divide it, taking care in doing this, that the teeth of the

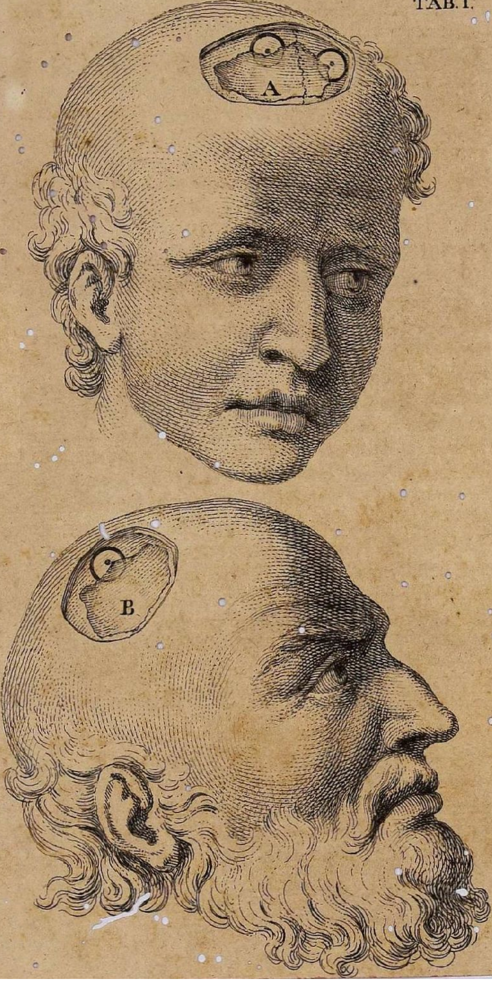
ſaw

ſaw do not wound the neighbouring bone; and for the greater ſecurity in this reſpect, we ſhould put a card or a very thin plate of lead between theſe two bones, to prevent the laſt ſtroke of the ſaw from injuring the ſound bone. See my *Obſervations*, page 36.

THE dreſſings require nothing different from what has been directed in treating of the amputation of the fingers.

OBSER-

TAB. I.



OBSERVATIONS

BY

Mr. CHESELDEN.

THERE are very few paſſages in the foregoing ſheets, in which I have ventured to differ from M. *Le Dran*; wherever I have, it has not been without ſuſpecting my own judgment; and I confeſs I have never read any book of ſurgery, from which I have learnt ſo much as from his. The judicious reader will diſcover in it the greateſt experience joined with the cleareſt judgment; and the young ſtudent will find an exactneſs, and a deſcending to the minuteſt particulars, which to him will be extremely uſeful, not to ſay neceſſary. I hope the plates which I have added (many of which are drawn with my own hands) will have the uſe which I intended, and give a clearer idea of the ſeveral operations than can poſſibly be given by any verbal deſcription.

PLATE I.

A, A FRACTURE of the ſkull where the ſcalp is taken off, ſufficient for the application of the trefine in any proper place. This fracture goes acroſs the ſagittal ſuture, which ſometimes extends from the noſe to the back part of the head, under which lies the longitudinal ſinus, and over which the

the trefine ſhould never be applied. And if one perforation is not ſufficient for raiſing ſuch a fracture, or if it ſhould be neceſſary to open the *dura mater* to diſcharge any extravaſated blood or matter, it will in this caſe be neceſſary to make another perforation on the other ſide of the ſinus: for no inſtrument ſhould be applied over that ſinus, nor ought the *levator* to be ever introduced between that and the ſkull.

I HAVE heard of an operation upon the middle of the *os frontis* by an ignorant ſurgeon, who wounded the longitudinal ſinus or veſſels that empty into it, and not knowing what he had done, concluded at firſt that this blood had been extravaſated before, but the quantity ſoon convinced him of his miſtake; upon which he ſtopt the bleeding with dry lint, and had the good luck to ſave his patient.

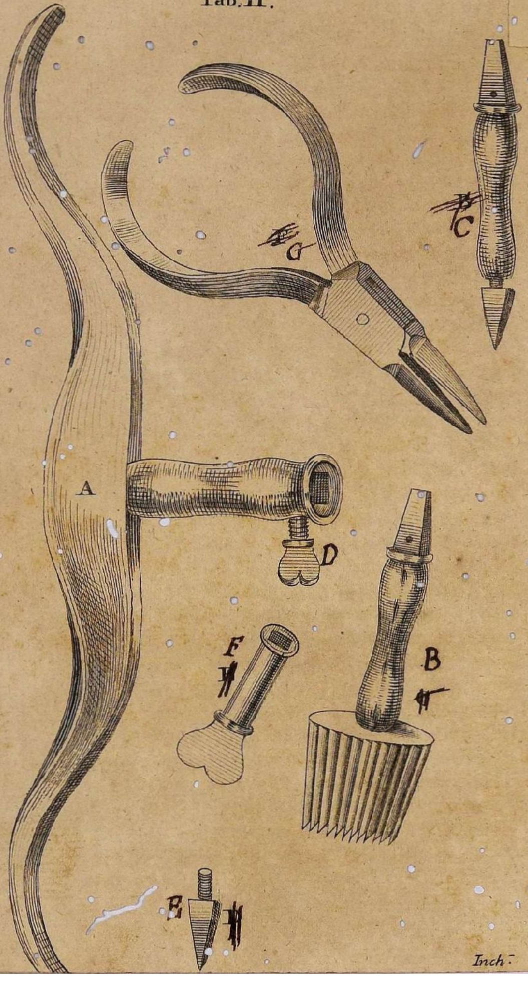
B, A FRACTURE in the parietal bone, where the trepan is but once applied, as that may be ſufficient for the purpoſe.

IN this, as in the former, the ſkull is bared with the ſame regard. And here I muſt obſerve that the veſſels in both are to be ſecured by ligatures, as ſoon as the ſcalp is taken off, that the operation may be proceeded upon without delay. It may be obſerved that the trepan in theſe operations is not applied to the moſt dependent parts, nor do I think that neceſſary: however, a patient being laid in bed, there will not be found much difference. See *Cheſelden's Anat.* page 39. laſt Ed.

IN caſes where the fractured bone is not looſe, great advantages ariſe from making the operation as is here directed; but where the fractured bones are looſe, we muſt be contented to make the operation as cloſe as we can to the fracture.

PLATE

Tab. II.



Inch.

PLATE. II.

Instruments for the foregoing operation.

In private operations I prefer the trefine, though the trepan may be thought more ufeful where expedition is neceffary, as in a battle, or a fea-engagement. A, the handle of the trefine, which fhould be made fo heavy that the hand may have little more to do than to direct it. B, the head or circular faw of the trefine, which muft be made conical, that the cavity in the infide may enlarge in the fame manner that the outfide does; otherwife the piece of bone, that is to be taken out, may chance to be wedged in the cavity, and obftruct the operation, which has fometimes happened, even where the crown or head is conical, when the inftrument-maker has neglected to give it the fame fhape on the infide. Befides, without the fhape it is impoffible to lean the inftrument to one fide or the other, as occafion may require during the operation. I muft alfo recommend to inftrument-makers to take care to make the teeth large, to prevent their clogging; and to make it of the beft fteel; for if the teeth are not hard the operation cannot be expeditious. C, an inftrument to be put into the handle of the trefine, to make the central perforation, which alfo fhould be of tempered fteel. D, a fcrew to fix thefe two laft parts in the trefine. E, the pin to be fcrewed in the middle of the head, to direct it till the teeth of the circular faw have made a fufficient groove to keep it fteddy. F, an inftrument to fcrew and unfcrew the pin. G, a pair of watch-maker's pliers, to take hold of any fplinters of bone: thefe the inftrument-

makers

makers ſhould have always ready of different ſizes, and made with teeth (the common ones being like a file) as it is a moſt uſeful inſtrument in ſurgery.

THE reſt of the inſtruments, which uſually accompany theſe, I have never had occaſion for, and think them not worth deſcribing. The piece of bone to be cut out, I have always completely ſeparated by the head of the trefine, and even taken it out with it. This leaves no ſplinters to do miſchief, and makes the lenticular uſeleſs; nor have I ever uſed the forceps or raſpatory.

N. B. ALL the inſtruments in this book are either made of their proper ſize, or to a ſcale of inches, that their true ſize may be rightly underſtood.

PLATE III.

FISTULA LACRYMALIS.

A, THE lacrymal ſac and ducts, where the matter is contained in the diſeaſe called *fiſtula lacrymalis*. The paſſage from the lower ſide of the *ſac* into the noſe being in this diſeaſe always obſtructed, the matter is eaſily ſqueezed out at the eye through the *lacrymal ducts*.

BB, PART of the inſtrument, with which, after the *ſac* is opened, we perforate into the noſe. This ſhews the proper place and direction in which the operation ſhould be performud.

C, THE Criſta Galli.

D, THE antrum of the upper jaw.

E, THE frontal ſinus.

F, THE ſphenoidal ſinus.

G, THE canula for the operation, fixed in its place. After the inciſion and perforation are made

TAB. III.

TAB. IV.

made, the wound muſt be enlarged with a ſpunge tent, and kept open for a day or two, before the reſt of the operation is performed.

PLATE IV.

Inſtruments to the fiſtula lacrymalis.

A, THE cautery, which being heated in a chafing-diſh of coals, we wet that part which we would not have hot, and then immediately paſs it through the canula. The ſmall end of the canula ſhould not paſs into the noſe, and the cautery ſhould not enter above half an inch, even in a man.

B, THE canula, whoſe aperture at the entrance muſt be above twice the diameter of that at the other end, by which means there will be room for the cautery to move about, and it will be leſs apt to heat the canula: To prevent which alſo it is proper to wrap the canula in a wet rag. Theſe things being neglected, great miſchief has been done by burning the eye-lid, and thereby diſgracing the operation. And very probably the entrance of the ducts into the lacrymal ſac have been burnt alſo, which prevents the tears from ever paſſing that way: but theſe cautions being uſed, no ſuch thing ever happens. Other methods of curing this diſeaſe have been much commended, though often unſucceſsful; but this, well performed, is infallible.

C, THE perforator for the *fiſtula lacrymalis*, which need not be very ſharp pointed.

PLATE V.

HARE-LIP.

A, A hare-lip, with a pricked line marking how much ſhould be cut off, in order to perform the operation. In the diviſion may be obſerved a tooth, which uſually projects in this manner in thoſe caſes where the jaw-bone is divided as well as the lip. This tooth, with ſo much of the jaw-bone as is protuberant, muſt be taken off previous to the operation; and the lip largely ſevered from the gum.

B, THE pins, which being firſt thruſt through one ſide, are then directed perpendicular to the ſurface of the wound on the other ſide: for if the two ſides of the wound are held together, and the pins thruſt through both ſides at once, the inſide of the wound will be cloſe, but the outſide will gape, and make an unſeemly ſcar.

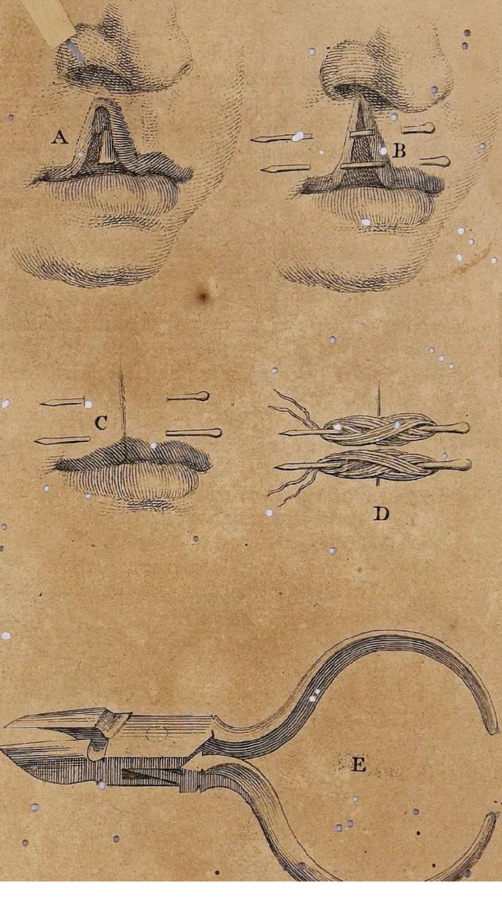
C, THE wound cloſed with the pins.

D, THE manner of fixing the wound with ligatures. The pins ſhould be made of gold, or at leaſt of ſilver, with their points armed with ſteel.

E, AN inſtrument called a nail-nipper, which I have found extremely uſeful in taking off a bit of the jaw bone, as mentioned in letter A.

N. B. IT muſt be the ſtraight-edged nail-nipper, as expreſſed in the plate.

TAB. V.



TAB. VI.

Tab. VII.

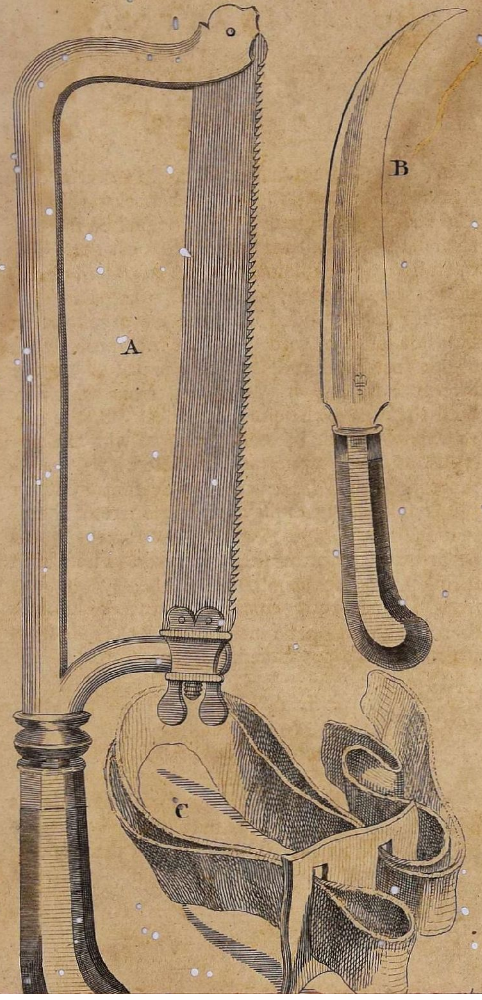


PLATE VI.

POLYPUS.

A, THE ſeptum naſi. B, a polypus, with a ligature to extract the polypus backwards; the two ends of this ligature are to be puſhed through the noſe by a ſmall wire or a bit of cat-gut. This operation was explained to me at *Paris*, but I cannot remember by whom. C, the palate; D, an inſtrument added for the more convenient direction of the cord. E, the polypus, which comes forwards, and is uſually extracted by the forceps. F, the *os ſpongioſum*, from which in both theſe caſes the polypus ariſes. G, the *iter ad aurem*, which by being covered with the polypus, as in the uppermoſt of theſe prints, ſometimes occaſions a degree of deafneſs. Theſe prints ſufficiently explain to the operator the ſituation of a polypus, and why the forceps ſhould be firſt introduced on the under ſide. Theſe both ſpring from the membranes of the *os ſpongioſum*, from whence they commonly proceed, though there is no part of the membrane of the noſe from which they do not ſometimes ariſe.

PLATE VII.

Amputating Inſtruments.

A, AN amputating ſaw, the frame of which is made ſtrong that the blade may be firmly extended; and of ſufficient weight to render the working

of it eafy. The blade fhould be made out of a clock fpring, which by long experience workmen have learnt to temper to the utmoft perfection. Such faws are ufed by all artificers who cut ivory and other hard fubftances, particularly comb-makers, where the fharpeft faws, as well as the niceft direction are required. But the teeth muft be made larger and wider than theirs, as a green bone will fooner clog the teeth than a dry one. From the experience of thefe people, I have alfo learnt the fitnefs of placing the handle in a line with the back, as in the plate; for as they rightly obferve, as foon as the teeth of the faw are fixed to the bone, the weight which their hand is to command lies chiefly in the back. B, the knife, in which there is nothing particular worth noting, excepting the fhape of the point, which is made fit to divide the ligament between two bones, and this makes a catling knife needlefs. C, a turniket, made of the ftrongeft cloth lift, with a fence of leather for the limb in the place where it twifts. This kind of turniket, being fubftantial and foft, is the beft that I have yet known for a fingle operation. But for armies and fleets Monf. *Petit's* turniket is unqueftionably the beft, and is a moft ufeful and excellent invention, as by a fufficient number of thefe any number of men may be fecured from bleeding to death, till the furgeons can affift them in their turn.

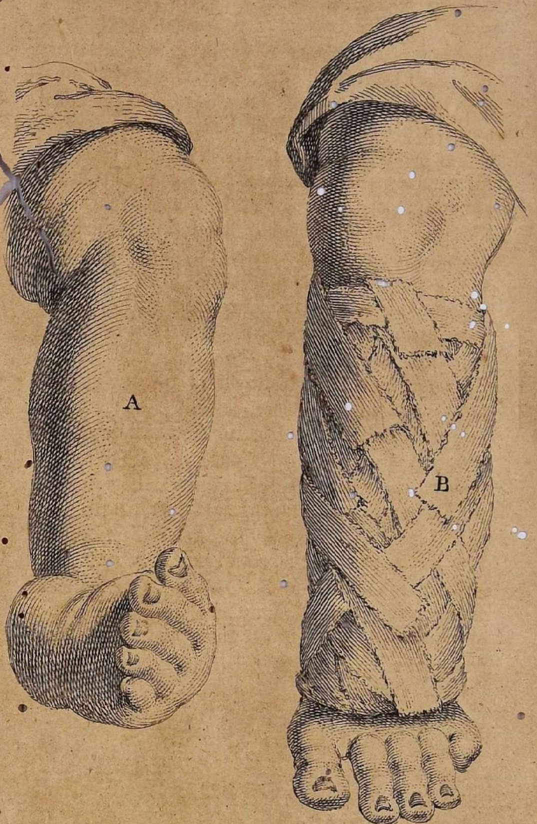
PLATE VIII.

The CLUB-FOOT.

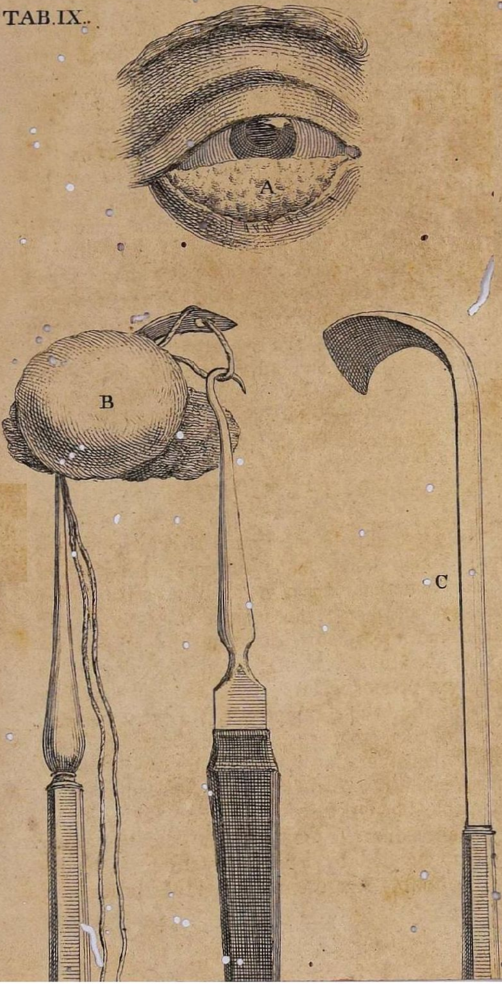
A, a limb diftorted from the birth. B, the bandage to cure this diftortion, which confifts of

feveral

TAB. VIII.



TAB.IX.



ſeveral pieces of linen rag dipt in a mixture of whites of eggs and flour. The firſt point to be gained in this cure, is to get the foot out ſtraight with the leg, holding it in that poſture till the bandage grows ſtiff; after this, by ſucceeding bandages, the foot may be brought into its proper ſituation. There is no bandage ſo equal as this for a fractured leg. I always uſe it, leaving that part upon the *tibia* very thin, that if it grows looſe by the abatement of a ſwelling, I can cut out a piece, and bind it cloſer. Upon a journey, I once ſet the cubital bones of a gentleman's arm that was broke; and making uſe of this bandage, he, the two next days, rode long journeys without any inconvenience, and at the end of forty days took it off, and was perfectly well. For further directions relating to the uſe of this bandage, ſee *Cheſelden's Anat.* p. 37.

TAB. IX.

A, THE adipoſe membrane in which the eye reſts, which being much inflamed, this kind of tumor ſometimes ariſes under the *tunica conjunctiva*, which membrane being divided by a knife all round the tumor, directing the inciſion towards the tumor, it may then be eaſily taken out by a pair of ſciſſars. It is not at all neceſſary to take the whole tumor out, for what remains will ſubſide from the bleeding and digeſtion; but if this operation is neglected, though the tumor frequently ſubſides, yet it leaves behind it an incurable blear-eye.

B, an indurated tonſil, whoſe baſe being too wide to be tied by a ſingle ligature, a needle with a double ligature being paſſed through, it

 may

may be drawn through the mouth by a hook, then being divided, one ligature is to be tied on the lower ſide of the gland, and the other above, by the help of the inſtrument D, Tab. VI. which I firſt invented to tie a tumor *in utero.*

C, an inſtrument to pull the gland forwards, and is alſo a good director for the needle; this operation, or the tying of the gland by one ligature, where it can be done, is always effectual. Mr. *Torr* informed me that an acquaintance of his, Mr. *Dunning*, an eminent ſurgeon of *Dorſetſhire*, has many years laſt paſt cured theſe tumors by burning them through a canula.

TAB. X.

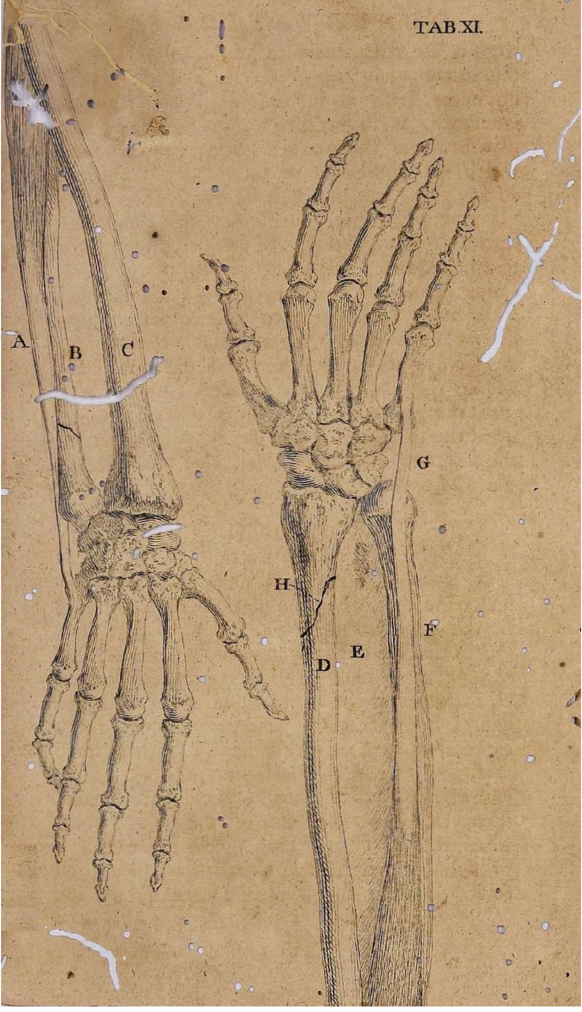
A, part of a director paſſed under the tendinous part of the maſtoid muſcle, which is inſerted into the ſternum, being, as I apprehend, all that is neceſſary to be cut in the operation of the wry-neck, the thin muſcular part of this muſcle that is inſerted into the clavicle, being capable of ſtretching after the operation. I have formerly divided the muſcle near the middle, thinking it would anſwer better, the whole muſcle being divided in that caſe (but I have altered my opinion).

B, a cancer'd breaſt, with ſo much of the ſkin marked with a line, as is neceſſary to be taken out with the cancer. C, the pectoral muſcle, as it appears after the cancer is diſſeated out. The way of extirpating cancers in the manner here deſcribed, was introduced with us by a bold, and not very ignorant clergyman. He was univerſally railed at by the profeſſion, which greatly helped on his reputation; but the

truth

TAB.X.

TAB.XI.



truth is, he extirpated with leſs loſs of ſkin, took the tumors out more clearly, and then tyed up every veſſel as he proceeded, and through ignorance, as they called it, dreſſed more ſimply than was the practice among ſurgeons; all which contributed to his ſucceſs, which exceeded any thing that had been known before. But his operations were tedious, and the more learned following the ſame method, his reputation in a manner faded away. This way of operating is equally proper in all glandular and cyſtic tumors, the practice of the crucial inciſion in theſe caſes being extremely barbarous; we have practiſed the ſame method in them, and in the extirpating a teſticle. I have always uſed the like method, leaving a part of the ſkin upon the teſticle, and not fleaing all the ſkin off the ſcrotum, and cutting away what was ſuperfluous afterwards.

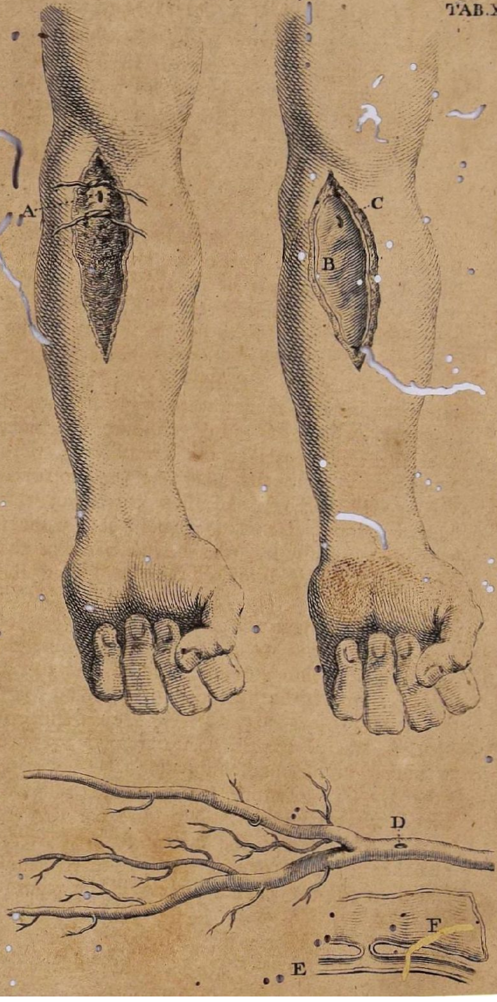
TAB. XI.

A, THE extenſor carpi ulnaris, which goes under the ulna when the hand is turned prone. B, the ulna fractured alone. C, the radius. D, the radius. E, *ligamentum tranſverſale cubiti.* F, the ulna. G, the extenſor ulnaris. H, a fracture of the radius. The uſe of theſe two figures is to ſhew the different poſition of the extenſor ulnaris, when the hand is turned prone or ſupine; when in the ſupine poſition (that is, with the palm of the hand upwards) this tendon then rides over the end of the ulna, which when that bone is fractured near the end of it preſſes downwards, and prevents its being well ſet; but when the hand is turned prone, the

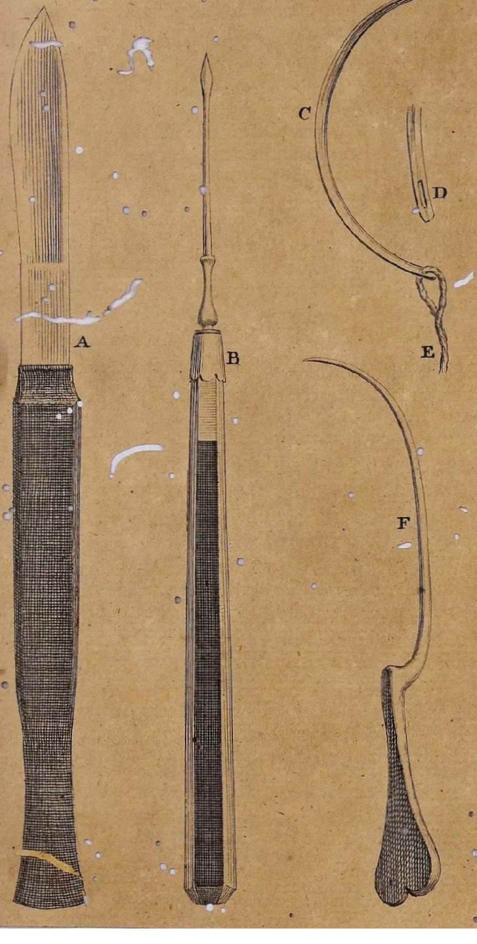
same tendon lies partly under the ulna, and presses it into its proper place. H, a fracture of the radius, which is seldom set without the bones bending inwards, the reason of which I cannot comprehend.

TAB. XII.

A, the operation of the aneurism, the artery tied by two ligatures. B, part of the sac of the aneurism. C, the orifice into the artery. D, the orifice, it being in the humeral artery. E, a section of part of the artery. F, a section of part of the aneurism. The membrane which makes the sac, and the inner coat of the artery, appear as much the same as if they were originally formed together, which has made authors conclude, that the outer coats of the artery only were wounded, and that the inner one was protruded through the orifice, and then extended; this indeed accounts for the sameness of the inner membrane of the sac, and the inner coat of the artery. But how little reflection will show the absurdity of this! For can it be supposed, that once in a thousand times, the external coats of the artery should be divided, and the internal not wounded? but the issuing out of the blood, at the time of the operation of bleeding, is a proof of the contrary. I have always thought that it was a communicant artery that was wounded in bleeding, supposing there was no other way of accounting for the sudden reflux of blood, after tying the first ligature; or that the wound was made in the inferior cubital artery, and then it was accounted for by the communication of the two cubital arteries in the palm of the


A
B
C
D
E
F

TAB. XIII.



the hand; thus ſatisfied, I enquired no farther, though Mr. *Sharp*, even ſo long ſince, as when he was my apprentice, told me, the wound was in the humeral artery, as indeed it is. The ſo ſudden reflux of the arterial blood ſhows how great a communication there is in the minute arteries; it alſo perſuades me of the truth of what I have been told by an eminent ſurgeon; that he had even performed the ſame operation with ſucceſs in the middle of the arm, on men that had been wounded in battle, and that the limbs perfectly recovered; but I own I did not then believe it.

TAB. XIII.

A, a knife, which we uſe in all operations, much to be preferred to the biſtory, which can never have a good edge and a ſtrong point.

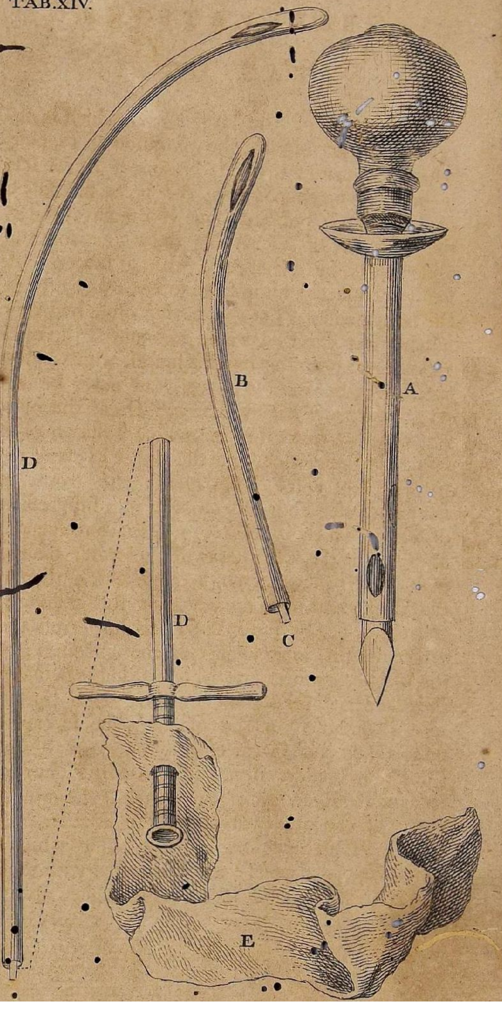
B, a couching needle, one part of the handle black, which I ordered for the firſt operation I performed, foreſeeing, that it might be uſeful to ſhow me what poſition the needle was in, in the eye. C, a crooked needle, ſufficient to take up the largeſt veſſel in a limb. D, the eye of the ſame needle. E, the ligature. The needle ſhould always be paſſed as cloſe to the artery as may be, and not take much fleſh; for taking in too much, when that fleſh begins to be divided by the ligature, it will grow looſe, and the artery bleed again. F, an inſtrument convenient to lift up the end of any ſmall artery to be tied, that lies in looſe membranous parts.

TAB. XIV.

A, a trocar of the largeſt ſize, which is neceſſary for performing the operation of tapping where the matter is viſcid, but one a degree leſs is better for common uſe; the holes ſhould be oval and well poliſhed; but if the navel ſtarts, the beſt way of diſcharging the water from the abdomen is by a puncture with a lancet. A ſmall inſtrument of the ſame ſort is often uſed in the hernia aquoſa, but that having often had very miſchievous effects, I would recommend the operation to be performed with a lancet, which being withdrawn before the water, can never be attended with any inconvenience. Doing this operation with a trocar has indeed more the air of a chirurgical operation, but the lancet in every reſpect is better for the patient; the trocar is ſometimes uſed above the *os pubis* in a ſuppreſſion of urine, which is ſubject to this inconvenience; after the trocar is withdrawn, the water finding more eaſy paſſage through the bladder, than it can through the integuments of the abdomen, and the orifice of the bladder receding from the orifice in the integuments of the abdomen; as the bladder empties, the urine will lodge between the bladder and thoſe integuments, and if the canula is continued in the bladder I ſhould expect no leſs pain than in a fit of the ſtone. However, I don't pretend to decide in this matter, but an inciſion about an inch long through the integuments of the abdomen above the *os pubis*, and about half an inch long in the bladder (which I have often performed), is not attended with theſe inconveniences; and ſurely pain, which always

cauſes

TAB. XIV.



TAB. XV.

caufes inflammation, fhould as much as poffible be avoided in this cafe. But before any operation is to be performed, it may not be amifs, to confider what fhould firft be attempted in this cafe. I have found, as I fuppofe, a ftoppage created by nothing but a little mucous matter in the urethra; and upon injecting warm water haftily down the urethra, the obftruction has been removed. Where this has failed, bleeding very plentifully, even till the patient faints, and afterwards repeating of it, if neceffary, and purging inceffantly with *fal. cath. am. vel Glaub.* which are very quick in their operation (for there is no time to be loft), has generally taken off the inflammation, and made an operation needlefs. Bathing, and even opiate clyfters, from the beft obfervations I have been able to make, appear to me of very little ufe in this cafe.

B, THE end of a female catheter. C. a ftilet. D-D, a male catheter, which fhould be thicker at the end, but not fo much as in this figure; and the holes in the catheter fhould be perfectly polifhed. E, a rag put upon the end of the catheter when it is ufed to draw off urine: one end being put into the veffel which receives the urine (when the ftream grows weak) directs it into the veffel.

TAB. XV.

[*To a fcale of three inches.*]

A, a gorget fix inches long befides the handle. B, the forceps twelve inches long, and about twelve ounces weight. C, one of the blades

blades of the forceps. This pair of forceps, with others of eleven, ten, and nine inches, are all that I have used: that of nine inches weighing four ounces, and the chops coming much closer together, but are not to be used in extracting a large stone; the small gorget not above four inches long besides the handle.

TAB. XVI.

A, a staff nine inches long directly from one extreme to another. B, the end of that staff expressed somewhat too large. C, the end of a gorget. D, a gorget. The forceps which they used when I first began to cut, were short, and with large teeth, which often broke the stone. The staff and gorget were made of silver, and the end of the staff with a stop to it; and being made of silver, the friction against one another were not well discerned, and the stop at the end was often the occasion of the gorget's not getting into the bladder, which in the consequence was death to the patient.

TAB. XVII.

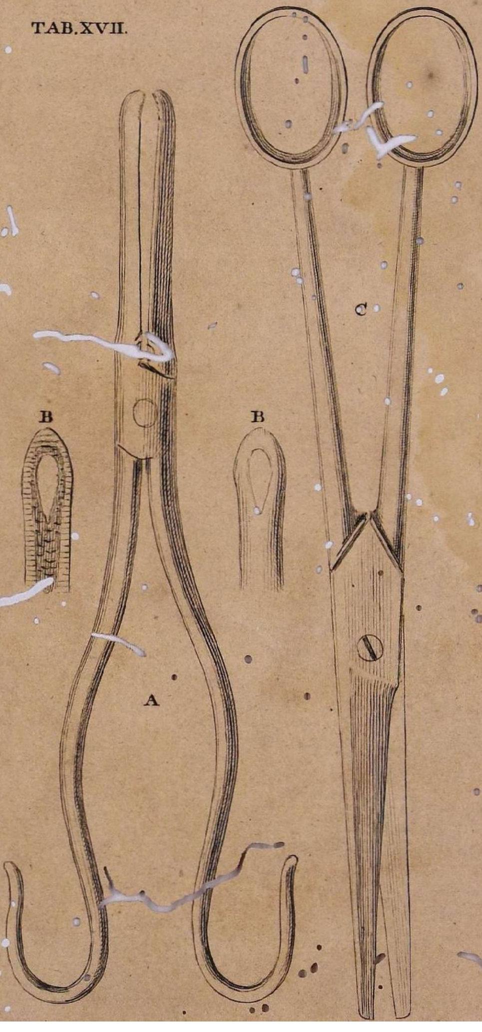
A PAIR of polypus forceps. B, B, the chops of the forceps, the external hole of which ought to be well polished. C, a pair of scissars with blunt points, very useful in surgery.

TAB. XVIII.

A, the fore-finger amputated with the skin enough to cover the bone. B, the finger taken off.

TAB.XVI.

TAB. XVII.



TAB. XVIII.

TAB.XIX.

off. C, the great toe taken off with the ſkin very much preſerved. D, the end of the *os cuneiforme* where it was joined.

TAB. XIX.

A, a limb on which the firſt part of an amputation is performed. B, C, a mark on the muſcles, where the cutis and *membrana adipoſa* were divided; the next inciſion is to be made cloſe to the ſkin, next the knee down to the bone.. D, the amputation completed. E, Tibia, F, Fibula. The operation being thus far performed, every veſſel is to be tied with as little fleſh included in the ligature as may be. The firſt part of the dreſſing ſhould be a digeſtive or lint dipt in oil, that it may come off again eaſily; then the whole cavity muſt be filled up with lint, and particular care muſt be taken, that the external ſkin may not lie over the tibia; then the ſtump muſt be comprized in a looſe knit cap, and gently rolled. G, the appearance of the ſtump after it is cured, which having but a ſmall ſcar was eaſily healed, the bones never needing an exfoliation, nor is it ſo liable to break out again. The thing that led me to do this operation was what has too often happened, the neceſſity of cutting off the end of a ſtump the ſecond time. This operation I propoſed to my maſter, when I was his apprentice, but he treated it with neglect, though he lived afterwards to practiſe it, when he had ſeen me perform it in the ſame hoſpital.

TAB.

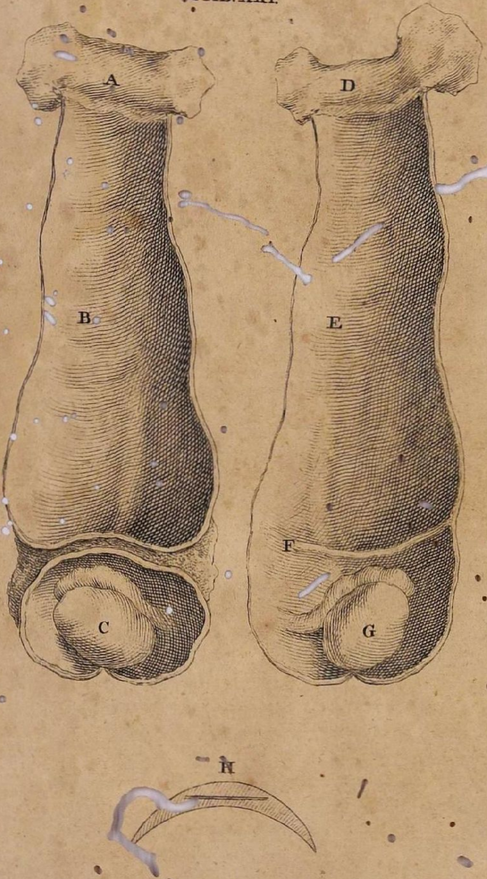
TAB. XX.

A, a ſection of the inteſtinum rectum. B, an abſceſs, which at leaſt is the firſt ſtate of the fiſtula in ano. C, that part of the gut, which appears externally. D, the buttock. E, a ſection of the inteſtinum rectum. F, an abſceſs, which at leaſt is the firſt ſtate of the fiſtula in ano. G, that part of the gut which is external. H, the buttock. I, one of the blades of the polypus forceps, introduced into the fiſtula, it being firſt dilated with a ſponge tent, the other blade being introduced into the arms, and then firmly holding ſo much as you would chuſe to cut out, make uſe of the ſciſſars, Tab. XVII. K. I formerly cut out a pyramidal piece in the manner here deſcribed, but I find this way with the forceps much more convenient, and more eaſy to be executed. The operation being thus performed, I have never found wanting a ſecond cutting; and if after this operation, there is an internal diſcharge into the gut, it may be an uſeful iſſue, and continue the benefit which nature deſigned by this diſeaſe. We ſhould be very careful not to perform this operation when the patient is troubled with the piles, for I have known one in that caſe bleed to death.

Formerly I have taken off piles by inciſion; till I had a patient, who after this operation bled ſo exceſſively, that I was forced to attend him night and day to ſtop the bleeding as often as he went to ſtool. From that time I always tied theſe tumors with a ligature, which I find the beſt method of cure, and attended with no inconvenience. As ſoon as the pile is tied, it muſt be returned into the gut.

TAB.XX.

TAB. XXI.



TAB. XXI.

A, part of the peritonæum. B, the ſac of the hernia inteſtinalis, extended as far as the teſticle. C, the teſticle incloſed in its tunica vaginalis. D, part of the peritonæum. E, the ſac of the hernia inteſtinalis, which had communicated itſelf to the teſticle. F, the line where it broke into the *tunica vaginalis teſtis*. G, the teſticle; in both theſe caſes the ſpermatic cord lies without ſide of the ſac, which is a ſufficient proof that the gut did not deſcend with the ſpermatic cord into the *proceſſus vaginalis*. I had this account of herniæ firſt from the late Dr. *Douglaſs*, a moſt induſtrious anatomiſt, very communicative, and much to be relied on, who was very clear, they did not deſcend with the ſpermatic cord, but from the appearance, thought that the whole was a production of the peritonæum. The preſent caſes I have from Mr. *Hunter*, a pupil of his, who diſſected many of thoſe which were ſhewn me by the doctor, and who, to all the good qualities of his great maſter, has added that of true philoſophy. For my own part, I ſuppoſe this ſac is formed, as the ſac is in an aneuriſm, and in cyſtic tumors, where they are not found in either caſes, while they are recent. H, an explanation of the lunated and tranſverſe inciſion, as made in *Celſus's* operation for the ſtone, which I have deſcribed in my book of anatomy, and which by ſome was not rightly underſtood.

I performed the operation for the hernia inteſtinalis, upon a gentleman of ſixty years of age ſome years ſince, who had laboured for twelve years

years under a large hernia inteſtinalis, which often returned, but at length being ſtrangled, I performed the operation. The ſac was very large and thick: I cut away the greateſt part of it, with part of the ſcrotum; after the gut was reduced, I took up with a ligature the whole ſac cloſe to the abdominal muſcles, which made a perfect cure. He lived many years after without any damage to the teſticle; which I think ſufficiently proves that the ſpermatic cord was on the outſide of the ſac.

I attended a patient of a very eminent ſurgeon, who had a rupture of the largeſt ſize for many years, which always returned into the abdomen when he lay on his back. This gentleman applied a large cauſtic about three inches long and two wide directly upon the part where the gut deſcended, and this not going deep enough, when the eſcar came off he applied eſcarotic powders till they conſumed one half of the ſac, and then healing from the bottom made a perfect cure. This is the way that ſo many quacks have pretended to cure ruptures, and have ſo ſeldom ſucceeded, not knowing that it is all in vain unleſs the ſac is opened, and an incarnation made from the bottom. But ſurely this would be done much more eaſily by a knife than a cauſtic, taking out about three inches of the ſkin in length, and two in breadth, with the *membrana adipoſa*, and about half the ſac; and then healing from the bottom.

AN ESSAY

Towards a New

Pharmacopœia Chirurgica.

THE ſurgery medicines in the public pharmacopœia (which has been chiefly collected from ſurgery writers) being for the moſt part compounded of too many ingredients, ſome of which are not to be had genuine, ſome ſpoiling the conſiſtence of the medicine, and ſome of very little efficacy; I have therefore contrived one for my own uſe, in which, I hope, theſe miſtakes are avoided, and which I here offer to the publick.

Emp. Adhæſivum.

℞ *Emp. Diach. ſimp.* ℔ xii.
Pic. Burgund. ℥ vi. *M.*

This plaſter is ſufficiently adheſive, if the diachylon is made with good oil, as it ought to be, and without any animal fat.

Emplaſt. e Cortic. Querc. ſeu Defenſivum.

℞ *Cortic. Quercus* ℔ iii. *Alumin.* ℥ iv.
Coq. in Aq ℔ xx. *Colatur ad* ℔ xvi.
Add. Litharg. Aur. ℔ x. *Ol. Olivar.* ℔ xx.
Pic. Burgund. ℥ iii. *M. F. E. S. A.*

 This

This plaſter is much more ſtyptic than the Emplaſtrum e bolo, and of a much better conſiſtence.

Emp. e Capſico Indico.

℞ *Capſic. Indic.* ℔ i.
Coq. in Aq. ℔ xvi. *Colat. ad* ℔ xii.
Adde Litharg. Aur. ℔ viii.
Ol. Olivar. ℔ xvi.
Pic. Burgund. ℔ iii.
Cer. Flav. ℔ ii. *M. F. E. S. A.*.

This plaſter is much warmer than that of Paracelſus, or the Diachylum cum Gummis.

Ung. Baſil. Nigr.

℞ *Ol. Olivar.* ℔ iii. *Cer. flav.* ℔ ii.
Pic. Naval. ℔ iv. *M. F. Un. S. A.*

This is a milder digeſtive, and leſs apt to raiſe fungous fleſh than the following:

Ung. Baſil. Flav.

℞ *Ol. Olivar.* ℔ iii. *Cer. flav.* ℔ ii.
Reſin. Alb. ℔ iv. *M. S. A.*

If any caſe wants a ſtronger digeſtive than this, it may be made by a mixture of Ol. Terebinth. at the time it is uſed. But if either Terebinth. or Ol. Terebinth. is put into this ointment long before, the Oil of the Terebinth. will evaporate, and leave the ointment of a bad conſiſtence.

Unguentum vel Ceratum e Lapid. Calamin.

℞ *Ol. Olivar.* ℔ xii.
Cer. flav.
Emp. Diach. ſimp.
Lap. Calamin. optime levigat. ana ℔ vi.
M. F. U. S. A.

This

This unguent ought never to be made with butter, becauſe that ſoon grows rancid, nor does any animal fat do ſo well as oil; becauſe it does not unite ſo well with the other ingredients; and in hot weather is apt to let the Lap. Calamin. ſeparate, and fall upon a ſore, which gives pain, it being corroſive alone, but in the compoſition is only deſiccative; and diachylon plaſter, which, when thinned with oil, is very tacky, ſupports the powder, and very much mends the conſiſtence of the ointment, without hindering the quality of it.

Emplaſtrum ex Euphorbio.

℞ *Emp. Diachyl.* ℔ x.
Euphorb. ℥ xii.
Pic. Burgund. ℥ i. ß

The Euphorbium, after being well powdered, ſhould be beat up to a fine paſte with a little oil in a mortar, and afterwards finely levigated with a little more oil, and then to be put into the plaſter. This is a moſt excellent ſuppurative plaſter, better than the Emplaſtrum Capſicum Indicum, and beyond all compariſon better than that of Paracelſus, both in its conſiſtence and uſe.

Emp. Anodynum.

℞ *Emp. Diachyl.* ℔ xiv.
Pic. Nigr. ℥ xi.
Cer. flav. ℔ ii.
Opium ℔ i. *M. f. Emplaſtrum.*

Dissolve the opium in warm water as much as is ſufficient, ſtrain it, and then make the plaſter with the decoction inſtead of ſimple water. This plaſter is of excellent uſe in old achs

 and

and pains, and for parts bruiſed. Mr. *Palmer*, an eminent ſurgeon and man-midwife at *Bath*, uſes it upon the abdomen after child-birth; which, he ſays, rarely or never fails to cure the pains and extenſion of the belly, which women in that caſe are very ſubject to.

An Ointment for the Itch.

HOGS-LARD, or butter, one pound; the beſt brimſtone finely powdered, half a pound; mix them, and apply the ointment to the legs only, keeping the ſtockings on afterwards. There is no need to purge the patient; for this ointment appears only by getting into the blood, which it purges in the ſame manner as mercurial unguent does. This medicine is not unknown; but I publiſh it here for the ſake of the poor, among whom this diſtemper moſtly prevails, and often ſpoils their conſtitutions.

The Peruvian Bark.

THE uſe of the Peruvian bark, internally given in caſes of ſurgery, has not been long known; about thirty years ſince it was highly recommended as a remedy againſt mortifications, without diſtinction, and upon no better foundation (as far as I can learn) than its having ſucceeded in one ſingle caſe: it was then tried in mortifications from old age and worn-out conſtitutions, without ſucceſs (which cannot be wondered at), and thus it fell into diſcredit. I have lately ſeen two caſes in which it has done wonders; the one, a very large fœtid ulcer in the leg; the other, in an arm cut off above the elbow, where the ulce-

rated

rated ſtump had never been healed, was extremely painful, and a ſinus was formed from the ſtump under the *membrana adipoſa* up to the head of the *os humeri*. The ulcers in both theſe caſes were extremely foul, the matter fœtid, thin, and corroſive; but, upon taking the bark, the matter ſoon grew perfectly good, the pain ceaſed, the ſores grew clean in a few days, and both the patients were ſoon after cured. Theſe two caſes were under the direction of Mr. *Ranby*, ſerjeant ſurgeon to his Majeſty, to whom we chiefly owe the preſent knowledge of its great uſes in ſurgery, and who intends to oblige the public with a treatiſe on that ſubject.

ADVERTISEMENT.

BEFORE the late act of parliament for making the surgeons and the barbers of *London* two separate and distinct corporations; the surgeons, who were members of the then united company, besides being subject to the power of spiritual courts, were liable to many heavy charges, amounting often to more than 100 *l.* before they had served all the offices of the company. And the privileges and advantages they enjoyed being chiefly under charters granted them in different reigns, were lately found very precarious, and not able to screen them in *Westminster-hall* from several expensive offices, from which they were formerly supposed to have been exempted. But, since the obtaining the above-mentioned act, all their said privileges are confirmed by the sanction of parliament, with the addition of several new ones, *viz.*

A LIBERTY (on receiving the company's grand diploma) of practising freely in any part of the king's dominions at home and abroad.

AN exemption from the several offices of constable, scavenger, overseer of the poor, and all other parish, ward, and leet offices; and from being put into or serving upon any jury or inquest.

AND